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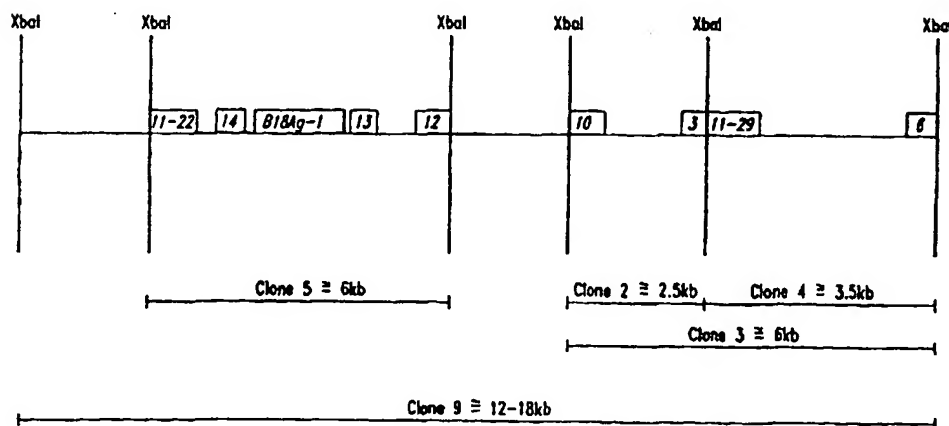
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C12N 15/12, C07K 14/47, 14/82, 14/15, C12Q 1/68, G01N 33/53, A61K 38/17, 39/00		A2	(11) International Publication Number: WO 97/25426
			(43) International Publication Date: 17 July 1997 (17.07.97)
(21) International Application Number: PCT/US97/00485			(81) Designated States: AL, AM, AT, AU, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 10 January 1997 (10.01.97)			
(30) Priority Data: 08/585,392 10 January 1996 (10.01.96) US 08/700,014 20 August 1996 (20.08.96) US			
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(54) Title: COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER

GENOMIC CLONE MAP



(57) Abstract

Compositions and methods for the detection and therapy of breast cancer are disclosed. The compounds provided include nucleotide sequences that are preferentially expressed in breast tumor tissue, as well as polypeptides encoded by such nucleotide sequences. Vaccines and pharmaceutical compositions comprising such compounds are also provided and may be used, for example, for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of antibodies, which are useful for diagnosing and monitoring the progression of breast cancer in a patient.

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DescriptionCOMPOSITIONS AND METHODS FOR THE TREATMENT
AND DIAGNOSIS OF BREAST CANCER

5

Technical Field

The present invention relates generally to the detection and therapy of breast cancer. The invention is more specifically related to nucleotide sequences that are preferentially expressed in breast tumor tissue and to polypeptides encoded by such
10 nucleotide sequences. The nucleotide sequences and polypeptides may be used in vaccines and pharmaceutical compositions for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of compounds, such as antibodies, useful for diagnosing and monitoring the progression of breast cancer in a patient.

15

Background of the Invention

Breast cancer is a significant health problem for women in the United States and throughout the world. Although advances have been made in detection and treatment of the disease, breast cancer remains the second leading cause of cancer-
20 related deaths in women, affecting more than 180,000 women in the United States each year. For women in North America, the life-time odds of getting breast cancer are now one in eight.

No vaccine or other universally successful method for the prevention or treatment of breast cancer is currently available. Management of the disease currently
25 relies on a combination of early diagnosis (through routine breast screening procedures) and aggressive treatment, which may include one or more of a variety of treatments such as surgery, radiotherapy, chemotherapy and hormone therapy. The course of treatment for a particular breast cancer is often selected based on a variety of prognostic parameters, including an analysis of specific tumor markers. *See, e.g.,* Porter-Jordan
30 and Lippman, *Breast Cancer* 8:73-100 (1994). However, the use of established markers often leads to a result that is difficult to interpret, and the high mortality

observed in breast cancer patients indicates that improvements are needed in the treatment, diagnosis and prevention of the disease.

Accordingly, there is a need in the art for improved methods for therapy and diagnosis of breast cancer. The present invention fulfills these needs and further
5 provides other related advantages.

Summary of the Invention

Briefly stated, the subject invention provides compositions and methods for the diagnosis and therapy of breast cancer. In one aspect, isolated DNA molecules
10 are provided, comprising (a) a nucleotide sequence preferentially expressed in breast cancer tissue, relative to normal tissue; (b) a variant of such a sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% (preferably no more than 5%) of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide
15 sequence are retained; or (c) a nucleotide sequence encoding an epitope of a polypeptide encoded by at least one of the above sequences. In one embodiment, the isolated DNA molecule comprises a human endogenous retroviral sequence recited in SEQ ID NO:1. In other embodiments, the isolated DNA molecule comprises a nucleotide sequence recited in any one of SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID
20 NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

In related embodiments, the isolated DNA molecule encodes an epitope of a polypeptide, wherein the polypeptide is encoded by a nucleotide sequence that: (a) hybridizes to a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID
25 NO:77 or SEQ ID NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions; and (b) is at least 80% identical to a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227; and wherein RNA
30 corresponding to said nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue.

In another embodiment, the present invention provides an isolated DNA molecule encoding an epitope of a polypeptide, the polypeptide being encoded by: (a) a nucleotide sequence transcribed from the sequence of SEQ ID NO: 141; or (b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained. Isolated DNA and RNA molecules comprising a nucleotide sequence complementary to a DNA molecule as described above are also provided.

10 In related aspects, the present invention provides recombinant expression vectors comprising a DNA molecule as described above and host cells transformed or transfected with such expression vectors.

In further aspects, polypeptides, comprising an amino acid sequence encoded by a DNA molecule as described above, and monoclonal antibodies that bind to such polypeptides are provided.

15 In yet another aspect, methods are provided for determining the presence of breast cancer in a patient. In one embodiment, the method comprises detecting, within a biological sample, a polypeptide as described above. In another embodiment, the method comprises detecting, within a biological sample, an RNA molecule encoding a polypeptide as described above. In yet another embodiment, the method comprises (a) intradermally injecting a patient with a polypeptide as described above; and (b) detecting an immune response on the patient's skin and therefrom detecting the presence of breast cancer in the patient. In further embodiments, the present invention provides methods for determining the presence of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO.: 78-86, SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under stringent conditions.

25 In a related aspect, diagnostic kits useful in the determination of breast cancer are provided. The diagnostic kits generally comprise either one or more monoclonal antibodies as described above, or one or more monoclonal antibodies that

bind to a polypeptide encoded by a nucleotide sequence selected from the group consisting of sequences provided in SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and a detection reagent.

5 Within a related aspect, the diagnostic kit comprises a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule as described above, or an RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

10 Within another related aspect, the diagnostic kit comprises at least one oligonucleotide probe, the probe comprising at least about 15 contiguous nucleotides of a DNA molecule as described above, or a DNA molecule selected from the group consisting of SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

15 In another related aspect, the present invention provides methods for monitoring the progression of breast cancer in a patient. In one embodiment, the method comprises: (a) detecting an amount, in a biological sample, of a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of polypeptide detected in steps (a) and (b), and
20 therefrom monitoring the progression of breast cancer in the patient. In another embodiment, the method comprises (a) detecting an amount, within a biological sample, of an RNA molecule encoding a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the
25 progression of breast cancer in the patient. In yet other embodiments, the present invention provides methods for monitoring the progression of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS: 78-86, SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under
30 stringent conditions.

In still other aspects, pharmaceutical compositions, which comprise a polypeptide as described above in combination with a physiologically acceptable carrier, and vaccines, which comprise a polypeptide as described above in combination with an immune response enhancer or adjuvant are provided. In yet other aspects, the present invention provides pharmaceutical compositions and vaccines comprising a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO.: 78-86, SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under stringent conditions.

In related aspects, the present invention provides methods for inhibiting the development of breast cancer in a patient, comprising administering to a patient a pharmaceutical composition or vaccine as described above.

These and other aspects of the present invention will become apparent upon reference to the following detailed description and attached drawings. All references disclosed herein are hereby incorporated by reference in their entirety as if each was incorporated individually.

Brief Description of the Drawings

Figure 1 shows the differential display PCR products, separated by gel electrophoresis, obtained from cDNA prepared from normal breast tissue (lanes 1 and 2) and from cDNA prepared from breast tumor tissue from the same patient (lanes 3 and 4). The arrow indicates the band corresponding to B18Ag1.

Figure 2 is a northern blot comparing the level of B18Ag1 mRNA in breast tumor tissue (lane 1) with the level in normal breast tissue.

Figure 3 shows the level of B18Ag1 mRNA in breast tumor tissue compared to that in various normal and non-breast tumor tissues as determined by RNase protection assays.

Figure 4 is a genomic clone map showing the location of additional retroviral sequences obtained from ends of XbaI restriction digests (provided in SEQ ID NO:3 - SEQ ID NO:10) relative to B18Ag1.

Figures 5A and 5B show the sequencing strategy, genomic organization and predicted open reading frame for the retroviral element containing B18Ag1.

Figure 6 shows the nucleotide sequence of the representative breast tumor-specific cDNA B18Ag1.

5 Figure 7 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag1.

Figure 8 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag2.

10 Figure 9 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag2a.

Figure 10 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1b.

Figure 11 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1a.

15 Figure 12 shows the nucleotide sequence of the representative breast tumor-specific cDNA B11Ag1.

Figure 13 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3c.

20 Figure 14 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG1.

Figure 15 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG3.

Figure 16 shows the nucleotide sequence of the representative breast tumor-specific cDNA B2CA2.

25 Figure 17 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA1.

Figure 18 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA2.

30 Figure 19 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3.

Figure 20 shows the nucleotide sequence of the representative breast tumor-specific cDNA B4CA1.

Figure 21A depicts RT-PCR analysis of breast tumor genes in breast tumor tissues (lanes 1-8) and normal breast tissues (lanes 9-13) and H₂O (lane 14).

5 Figure 21B depicts RT-PCR analysis of breast tumor genes in prostate tumors (lane 1,2), colon tumors (lane 3), lung tumor (lane 4), normal prostate (lane 5), normal colon (lane 6), normal kidney (lane 7), normal liver (lane 8), normal lung (lane 9), normal ovary (lanes 10, 18), normal pancreases (lanes 11, 12), normal skeletal muscle (lane 13), normal skin (lane 14), normal stomach (lane 15), normal testes (lane 10 16), normal small intestine (lane 17), HBL-100 (lane 19), MCF-12A (lane 20), breast tumors (lanes 21-23), H₂O (lane 24), and colon tumor (lane 25).

Detailed Description of the Invention

As noted above, the present invention is generally directed to
15 compositions and methods for the diagnosis, monitoring and therapy of breast cancer. The compositions described herein include polypeptides, nucleic acid sequences and antibodies. Polypeptides of the present invention generally comprise at least a portion of a protein that is expressed at a greater level in human breast tumor tissue than in normal breast tissue (*i.e.*, the level of RNA encoding the polypeptide is at least 2-fold
20 higher in tumor tissue). Such polypeptides are referred to herein as breast tumor-specific polypeptides, and cDNA molecules encoding such polypeptides are referred to as breast tumor-specific cDNAs. Nucleic acid sequences of the subject invention generally comprise a DNA or RNA sequence that encodes all or a portion of a polypeptide as described above, or that is complementary to such a sequence.
25 Antibodies are generally immune system proteins, or fragments thereof, that are capable of binding to a portion of a polypeptide as described above. Antibodies can be produced by cell culture techniques, including the generation of monoclonal antibodies as described herein, or via transfection of antibody genes into suitable bacterial or mammalian cell hosts, in order to allow for the production of recombinant antibodies.

30 Polypeptides within the scope of this invention include, but are not limited to, polypeptides (and epitopes thereof) encoded by a human endogenous

retroviral sequence, such as the sequence designated B18Ag1 (Figure 5 and SEQ ID NO:1). Also within the scope of the present invention are polypeptides encoded by other sequences within the retroviral genome containing B18Ag1 (SEQ ID NO: 141). Such sequences include, but are not limited to, the sequences recited in SEQ ID NO:3 -

5 SEQ ID NO:10. B18Ag1 has homology to the *gag* p30 gene of the endogenous human retroviral element S71, as described in Werner et al., *Virology* 174:225-238 (1990) and also shows homology to about thirty other retroviral *gag* genes. As discussed in more detail below, the present invention also includes a number of additional breast tumor-specific polypeptides, such as those encoded by the nucleotide sequences recited in

10 SEQ ID NO:11 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227. As used herein, the term "polypeptide" encompasses amino acid chains of any length, including full length proteins containing the sequences recited herein. A polypeptide comprising an epitope of a protein containing a sequence as described herein may consist entirely

15 of the epitope, or may contain additional sequences. The additional sequences may be derived from the native protein or may be heterologous, and such sequences may (but need not) possess immunogenic or antigenic properties.

An "epitope," as used herein is a portion of a polypeptide that is recognized (*i.e.*, specifically bound) by a B-cell and/or T-cell surface antigen receptor.

20 Epitopes may generally be identified using well known techniques, such as those summarized in Paul, *Fundamental Immunology*, 3rd ed., 243-247 (Raven Press, 1993) and references cited therein. Such techniques include screening polypeptides derived from the native polypeptide for the ability to react with antigen-specific antisera and/or T-cell lines or clones. An epitope of a polypeptide is a portion that reacts with such

25 antisera and/or T-cells at a level that is similar to the reactivity of the full length polypeptide (*e.g.*, in an ELISA and/or T-cell reactivity assay). Such screens may generally be performed using methods well known to those of ordinary skill in the art, such as those described in Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. B-cell and T-cell epitopes may also be predicted via

30 computer analysis. Polypeptides comprising an epitope of a polypeptide that is

preferentially expressed in a tumor tissue (with or without additional amino acid sequence) are within the scope of the present invention.

The compositions and methods of the present invention also encompass variants of the above polypeptides and nucleic acid sequences encoding such polypeptides. A polypeptide "variant," as used herein, is a polypeptide that differs from the native polypeptide in substitutions and/or modifications, such that the antigenic and/or immunogenic properties of the polypeptide are retained. Such variants may generally be identified by modifying one of the above polypeptide sequences and evaluating the reactivity of the modified polypeptide with antisera and/or T-cells as described above. Nucleic acid variants may contain one or more substitutions, deletions, insertions and/or modifications such that the antigenic and/or immunogenic properties of the encoded polypeptide are retained. One preferred variant of the polypeptides described herein is a variant that contains nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions.

Preferably, a variant contains conservative substitutions. A "conservative substitution" is one in which an amino acid is substituted for another amino acid that has similar properties, such that one skilled in the art of peptide chemistry would expect the secondary structure and hydrophobic nature of the polypeptide to be substantially unchanged. In general, the following groups of amino acids represent conservative changes: (1) ala, pro, gly, glu, asp, gln, asn, ser, thr; (2) cys, ser, tyr, thr; (3) val, ile, leu, met, ala, phe; (4) lys, arg, his; and (5) phe, tyr, trp, his.

Variants may also (or alternatively) be modified by, for example, the deletion or addition of amino acids that have minimal influence on the immunogenic or antigenic properties, secondary structure and hydrophobic nature of the polypeptide. For example, a polypeptide may be conjugated to a signal (or leader) sequence at the N-terminal end of the protein which co-translationally or post-translationally directs transfer of the protein. The polypeptide may also be conjugated to a linker or other sequence for ease of synthesis, purification or identification of the polypeptide (*e.g.*,

poly-His), or to enhance binding of the polypeptide to a solid support. For example, a polypeptide may be conjugated to an immunoglobulin Fc region.

In general, nucleotide sequences encoding all or a portion of the polypeptides described herein may be prepared using any of several techniques. For example, cDNA molecules encoding such polypeptides may be cloned on the basis of the breast tumor-specific expression of the corresponding mRNAs, using differential display PCR. This technique compares the amplified products from RNA template prepared from normal and breast tumor tissue. cDNA may be prepared by reverse transcription of RNA using a (dT)₁₂AG primer. Following amplification of the cDNA using a random primer, a band corresponding to an amplified product specific to the tumor RNA may be cut out from a silver stained gel and subcloned into a suitable vector (*e.g.*, the T-vector, Novagen, Madison, WI). Nucleotide sequences encoding all or a portion of the breast tumor-specific polypeptides disclosed herein may be amplified from cDNA prepared as described above using the random primers shown in SEQ ID NO.:87-125.

Alternatively, a gene encoding a polypeptide as described herein (or a portion thereof) may be amplified from human genomic DNA, or from breast tumor cDNA, via polymerase chain reaction. For this approach, B18Ag1 sequence-specific primers may be designed based on the sequence provided in SEQ ID NO.:1, and may be purchased or synthesized. One suitable primer pair for amplification from breast tumor cDNA is (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO.:126) and (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO.:127). An amplified portion of B18Ag1 may then be used to isolate the full length gene from a human genomic DNA library or from a breast tumor cDNA library, using well known techniques, such as those described in Sambrook et al., *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (1989). Other sequences within the retroviral genome of which B18Ag1 is a part may be similarly prepared by screening human genomic libraries using B18Ag1-specific sequences as probes. Nucleotides translated into protein from the retroviral genome shown in SEQ ID NO.:141 may then be determined by cloning the corresponding cDNAs, predicting the open reading frames and cloning the appropriate cDNAs into a vector containing a viral

promoter, such as T7. The resulting constructs can be employed in a translation reaction, using techniques known to those of skill in the art, to identify nucleotide sequences which result in expressed protein. Similarly, primers specific for the remaining breast tumor-specific polypeptides described herein may be designed based
5 on the nucleotide sequences provided in SEQ ID NO:11 - SEQ ID NO:86 and SEQ ID NO:142-SEQ ID NO:226.

Recombinant polypeptides encoded by the DNA sequences described above may be readily prepared from the DNA sequences. For example, supernatants from suitable host/vector systems which secrete recombinant protein or polypeptide
10 into culture media may be first concentrated using a commercially available filter. Following concentration, the concentrate may be applied to a suitable purification matrix such as an affinity matrix or an ion exchange resin. Finally, one or more reverse phase HPLC steps can be employed to further purify a recombinant polypeptide.

In general, any of a variety of expression vectors known to those of
15 ordinary skill in the art may be employed to express recombinant polypeptides of this invention. Expression may be achieved in any appropriate host cell that has been transformed or transfected with an expression vector containing a DNA molecule that encodes a recombinant polypeptide. Suitable host cells include prokaryotes, yeast and higher eukaryotic cells. Preferably, the host cells employed are *E. coli*, yeast or a
20 mammalian cell line such as COS or CHO.

Such techniques may also be used to prepare polypeptides comprising epitopes or variants of the native polypeptides. For example, variants of a native polypeptide may generally be prepared using standard mutagenesis techniques, such as oligonucleotide-directed site-specific mutagenesis, and sections of the DNA sequence
25 may be removed to permit preparation of truncated polypeptides. Portions and other variants having fewer than about 100 amino acids, and generally fewer than about 50 amino acids, may also be generated by synthetic means, using techniques well known to those of ordinary skill in the art. For example, such polypeptides may be synthesized using any of the commercially available solid-phase techniques, such as the Merrifield
30 solid-phase synthesis method, where amino acids are sequentially added to a growing amino acid chain. See Merrifield, *J. Am. Chem. Soc.* 85:2149-2146 (1963). Equipment

for automated synthesis of polypeptides is commercially available from suppliers such as Applied BioSystems, Inc., Foster City, CA, and may be operated according to the manufacturer's instructions.

In specific embodiments, polypeptides of the present invention encompass amino acid sequences encoded by a DNA molecule having a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227, variants of such polypeptides that are encoded by DNA molecules containing one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, and epitopes of the above polypeptides. Polypeptides within the scope of the present invention also include polypeptides (and epitopes thereof) encoded by DNA sequences that hybridize to a DNA molecule having a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions, wherein the DNA sequences are at least 80% identical in overall sequence to a recited sequence and wherein RNA corresponding to the nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue. As used herein, "stringent conditions" refers to prewashing in a solution of 6X SSC, 0.2% SDS; hybridizing at 65°C, 6X SSC, 0.2% SDS overnight; followed by two washes of 30 minutes each in 1X SSC, 0.1% SDS at 65°C and two washes of 30 minutes each in 1 X SSC, 0.1% SDS at 65°C. DNA molecules according to the present invention include molecules that encode any of the above polypeptides.

In another aspect of the present invention, antibodies are provided. Such antibodies may be prepared by any of a variety of techniques known to those of ordinary skill in the art. See, e.g., Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. In one such technique, an immunogen comprising the polypeptide is initially injected into any of a wide variety of mammals (e.g., mice, rats, rabbits, sheep or goats). In this step, the polypeptides of this invention may serve as the immunogen without modification. Alternatively, particularly for relatively short polypeptides, a superior immune response may be elicited if the

polypeptide is joined to a carrier protein, such as bovine serum albumin or keyhole limpet hemocyanin. The immunogen is injected into the animal host, preferably according to a predetermined schedule incorporating one or more booster immunizations, and the animals are bled periodically. Polyclonal antibodies specific
5 for the polypeptide may then be purified from such antisera by, for example, affinity chromatography using the polypeptide coupled to a suitable solid support.

Monoclonal antibodies specific for the antigenic polypeptide of interest may be prepared, for example, using the technique of Kohler and Milstein, *Eur. J. Immunol.* 6:511-519 (1976), and improvements thereto. Briefly, these methods involve
10 the preparation of immortal cell lines capable of producing antibodies having the desired specificity (*i.e.*, reactivity with the polypeptide of interest). Such cell lines may be produced, for example, from spleen cells obtained from an animal immunized as described above. The spleen cells are then immortalized by, for example, fusion with a myeloma cell fusion partner, preferably one that is syngeneic with the immunized
15 animal. A variety of fusion techniques may be employed. For example, the spleen cells and myeloma cells may be combined with a nonionic detergent for a few minutes and then plated at low density on a selective medium that supports the growth of hybrid cells, but not myeloma cells. A preferred selection technique uses HAT (hypoxanthine, aminopterin, thymidine) selection. After a sufficient time, usually about 1 to 2 weeks,
20 colonies of hybrids are observed. Single colonies are selected and their culture supernatants tested for binding activity against the polypeptide. Hybridomas having high reactivity and specificity are preferred.

Monoclonal antibodies may be isolated from the supernatants of growing hybridoma colonies. In addition, various techniques may be employed to
25 enhance the yield, such as injection of the hybridoma cell line into the peritoneal cavity of a suitable vertebrate host, such as a mouse. Monoclonal antibodies may then be harvested from the ascites fluid or the blood. Contaminants may be removed from the antibodies by conventional techniques, such as chromatography, gel filtration, precipitation, and extraction. The polypeptides of this invention may be used in the
30 purification process in, for example, an affinity chromatography step.

Antibodies may be used, for example, in methods for detecting breast cancer in a patient. Such methods involve using an antibody to detect the presence or absence of a breast tumor-specific polypeptide as described herein in a suitable biological sample. As used herein, suitable biological samples include tumor or normal
5 tissue biopsy, mastectomy, blood, lymph node, serum or urine samples, or other tissue, homogenate, or extract thereof obtained from a patient.

There are a variety of assay formats known to those of ordinary skill in the art for using an antibody to detect polypeptide markers in a sample. See, e.g., Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory,
10 1988. For example, the assay may be performed in a Western blot format, wherein a protein preparation from the biological sample is submitted to gel electrophoresis, transferred to a suitable membrane and allowed to react with the antibody. The presence of the antibody on the membrane may then be detected using a suitable detection reagent, as described below.

15 In another embodiment, the assay involves the use of antibody immobilized on a solid support to bind to the polypeptide and remove it from the remainder of the sample. The bound polypeptide may then be detected using a second antibody or reagent that contains a reporter group. Alternatively, a competitive assay may be utilized, in which a polypeptide is labeled with a reporter group and allowed to
20 bind to the immobilized antibody after incubation of the antibody with the sample. The extent to which components of the sample inhibit the binding of the labeled polypeptide to the antibody is indicative of the reactivity of the sample with the immobilized antibody, and as a result, indicative of the concentration of polypeptide in the sample.

The solid support may be any material known to those of ordinary skill
25 in the art to which the antibody may be attached. For example, the solid support may be a test well in a microtiter plate or a nitrocellulose filter or other suitable membrane. Alternatively, the support may be a bead or disc, such as glass, fiberglass, latex or a plastic material such as polystyrene or polyvinylchloride. The support may also be a magnetic particle or a fiber optic sensor, such as those disclosed, for example, in U.S.
30 Patent No. 5,359,681.

The antibody may be immobilized on the solid support using a variety of techniques known to those in the art, which are amply described in the patent and scientific literature. In the context of the present invention, the term "immobilization" refers to both noncovalent association, such as adsorption, and covalent attachment (which may be a direct linkage between the antigen and functional groups on the support or may be a linkage by way of a cross-linking agent). Immobilization by adsorption to a well in a microtiter plate or to a membrane is preferred. In such cases, adsorption may be achieved by contacting the antibody, in a suitable buffer, with the solid support for a suitable amount of time. The contact time varies with temperature, but is typically between about 1 hour and 1 day. In general, contacting a well of a plastic microtiter plate (such as polystyrene or polyvinylchloride) with an amount of antibody ranging from about 10 ng to about 1 μ g, and preferably about 100-200 ng, is sufficient to immobilize an adequate amount of polypeptide.

Covalent attachment of antibody to a solid support may also generally be achieved by first reacting the support with a bifunctional reagent that will react with both the support and a functional group, such as a hydroxyl or amino group, on the antibody. For example, the antibody may be covalently attached to supports having an appropriate polymer coating using benzoquinone or by condensation of an aldehyde group on the support with an amine and an active hydrogen on the binding partner (*see, e.g.,* Pierce Immunotechnology Catalog and Handbook (1991) at A12-A13).

In certain embodiments, the assay for detection of polypeptide in a sample is a two-antibody sandwich assay. This assay may be performed by first contacting an antibody that has been immobilized on a solid support, commonly the well of a microtiter plate, with the biological sample, such that the polypeptide within the sample are allowed to bind to the immobilized antibody. Unbound sample is then removed from the immobilized polypeptide-antibody complexes and a second antibody (containing a reporter group) capable of binding to a different site on the polypeptide is added. The amount of second antibody that remains bound to the solid support is then determined using a method appropriate for the specific reporter group.

More specifically, once the antibody is immobilized on the support as described above, the remaining protein binding sites on the support are typically

blocked. Any suitable blocking agent known to those of ordinary skill in the art, such as bovine serum albumin or Tween 20™ (Sigma Chemical Co., St. Louis, MO). The immobilized antibody is then incubated with the sample, and polypeptide is allowed to bind to the antibody. The sample may be diluted with a suitable diluent, such as phosphate-buffered saline (PBS) prior to incubation. In general, an appropriate contact time (*i.e.*, incubation time) is that period of time that is sufficient to detect the presence of polypeptide within a sample obtained from an individual with breast cancer. Preferably, the contact time is sufficient to achieve a level of binding that is at least 95% of that achieved at equilibrium between bound and unbound polypeptide. Those of ordinary skill in the art will recognize that the time necessary to achieve equilibrium may be readily determined by assaying the level of binding that occurs over a period of time. At room temperature, an incubation time of about 30 minutes is generally sufficient.

Unbound sample may then be removed by washing the solid support with an appropriate buffer, such as PBS containing 0.1% Tween 20™. The second antibody, which contains a reporter group, may then be added to the solid support. Preferred reporter groups include enzymes (such as horseradish peroxidase), substrates, cofactors, inhibitors, dyes, radionuclides, luminescent groups, fluorescent groups and biotin. The conjugation of antibody to reporter group may be achieved using standard methods known to those of ordinary skill in the art.

The second antibody is then incubated with the immobilized antibody-polypeptide complex for an amount of time sufficient to detect the bound polypeptide. An appropriate amount of time may generally be determined by assaying the level of binding that occurs over a period of time. Unbound second antibody is then removed and bound second antibody is detected using the reporter group. The method employed for detecting the reporter group depends upon the nature of the reporter group. For radioactive groups, scintillation counting or autoradiographic methods are generally appropriate. Spectroscopic methods may be used to detect dyes, luminescent groups and fluorescent groups. Biotin may be detected using avidin, coupled to a different reporter group (commonly a radioactive or fluorescent group or an enzyme). Enzyme reporter groups may generally be detected by the addition of substrate (generally for a

specific period of time), followed by spectroscopic or other analysis of the reaction products.

To determine the presence or absence of breast cancer, the signal detected from the reporter group that remains bound to the solid support is generally compared to a signal that corresponds to a predetermined cut-off value established from non-tumor tissue. In one preferred embodiment, the cut-off value is the average mean signal obtained when the immobilized antibody is incubated with samples from patients without breast cancer. In general, a sample generating a signal that is three standard deviations above the predetermined cut-off value may be considered positive for breast cancer. In an alternate preferred embodiment, the cut-off value is determined using a Receiver Operator Curve, according to the method of Sackett et al., *Clinical Epidemiology: A Basic Science for Clinical Medicine*, p. 106-7 (Little Brown and Co., 1985). Briefly, in this embodiment, the cut-off value may be determined from a plot of pairs of true positive rates (*i.e.*, sensitivity) and false positive rates (100%-specificity) that correspond to each possible cut-off value for the diagnostic test result. The cut-off value on the plot that is the closest to the upper left-hand corner (*i.e.*, the value that encloses the largest area) is the most accurate cut-off value, and a sample generating a signal that is higher than the cut-off value determined by this method may be considered positive. Alternatively, the cut-off value may be shifted to the left along the plot, to minimize the false positive rate, or to the right, to minimize the false negative rate. In general, a sample generating a signal that is higher than the cut-off value determined by this method is considered positive for breast cancer.

In a related embodiment, the assay is performed in a flow-through or strip test format, wherein the antibody is immobilized on a membrane, such as nitrocellulose. In the flow-through test, the polypeptide within the sample bind to the immobilized antibody as the sample passes through the membrane. A second, labeled antibody then binds to the antibody-polypeptide complex as a solution containing the second antibody flows through the membrane. The detection of bound second antibody may then be performed as described above. In the strip test format, one end of the membrane to which antibody is bound is immersed in a solution containing the sample. The sample migrates along the membrane through a region containing second antibody

and to the area of immobilized antibody. Concentration of second antibody at the area of immobilized antibody indicates the presence of breast cancer. Typically, the concentration of second antibody at that site generates a pattern, such as a line, that can be read visually. The absence of such a pattern indicates a negative result. In general, 5 the amount of antibody immobilized on the membrane is selected to generate a visually discernible pattern when the biological sample contains a level of polypeptide that would be sufficient to generate a positive signal in the two-antibody sandwich assay, in the format discussed above. Preferably, the amount of antibody immobilized on the membrane ranges from about 25 ng to about 1 μ g, and more preferably from about 50 10 ng to about 1 μ g. Such tests can typically be performed with a very small amount of biological sample.

The presence or absence of breast cancer in a patient may also be determined by evaluating the level of mRNA encoding a breast tumor-specific polypeptide as described herein within the biological sample (*e.g.*, a biopsy, 15 mastectomy and/or blood sample from a patient) relative to a predetermined cut-off value. Such an evaluation may be achieved using any of a variety of methods known to those of ordinary skill in the art such as, for example, *in situ* hybridization and amplification by polymerase chain reaction. For example, polymerase chain reaction may be used to amplify sequences from cDNA prepared from RNA that is isolated from 20 one of the above biological samples. Sequence-specific primers for use in such amplification may be designed based on the sequences provided in any one of SEQ ID NO:1 or SEQ ID NO:11 - SEQ ID NO:86 and SEQ ID NO:142-SEQ ID NO:226, and may be purchased or synthesized. In the case of B18Ag1, as noted herein, one suitable primer pair is B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID 25 NO.:126) and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO.:127). The PCR reaction products may then be separated by gel electrophoresis and visualized according to methods well known to those of ordinary skill in the art. Amplification is typically performed on samples obtained from matched pairs of tissue (tumor and non-tumor tissue from the same individual) or from unmatched pairs of 30 tissue (tumor and non-tumor tissue from different individuals). The amplification reaction is preferably performed on several dilutions of cDNA spanning two orders of

magnitude. A two-fold or greater increase in expression in several dilutions of the tumor sample as compared to the same dilution of the non-tumor sample is considered positive.

Conventional RT-PCR protocols using agarose and ethidium bromide staining while important in defining gene specificity do not lend themselves to diagnostic kit development because of the time and effort required in making them quantitative (i.e., construction of saturation and/or titration curves), and their sample throughput. This problem is overcome by the development of procedures such as real time RT-PCR which allows for assays to be performed in single tubes, and in turn can be modified for use in 96 well plate formats. Instrumentation to perform such methodologies are available from ABI/Perkin Elmer. Alternatively, other high throughput assays using labelled probes (e.g., digoxigenin) in combination with labelled (e.g., enzyme fluorescent, radioactive) antibodies to such probes can also be used in the development of 96 well plate assays.

In yet another method for determining the presence or absence of breast cancer in a patient, one or more of the breast tumor-specific polypeptides described may be used in a skin test. As used herein, a "skin test" is any assay performed directly on a patient in which a delayed-type hypersensitivity (DTH) reaction (such as swelling, reddening or dermatitis) is measured following intradermal injection of one or more polypeptides as described above. Such injection may be achieved using any suitable device sufficient to contact the polypeptide or polypeptides with dermal cells of the patient, such as a tuberculin syringe or 1 mL syringe. Preferably, the reaction is measured at least 48 hours after injection, more preferably 48-72 hours.

The DTH reaction is a cell-mediated immune response, which is greater in patients that have been exposed previously to a test antigen (i.e., an immunogenic portion of a polypeptide employed, or a variant thereof). The response may be measured visually, using a ruler. In general, a response that is greater than about 0.5 cm in diameter, preferably greater than about 5.0 cm in diameter, is a positive response, indicative of breast cancer.

The breast tumor-specific polypeptides described herein are preferably formulated, for use in a skin test, as pharmaceutical compositions containing at least

one polypeptide and a physiologically acceptable carrier, such as water, saline, alcohol, or a buffer. Such compositions typically contain one or more of the above polypeptides in an amount ranging from about 1 μ g to 100 μ g, preferably from about 10 μ g to 50 μ g in a volume of 0.1 mL. Preferably, the carrier employed in such pharmaceutical
5 compositions is a saline solution with appropriate preservatives, such as phenol and/or Tween 80™.

In other aspects of the present invention, the progression and/or response to treatment of a breast cancer may be monitored by performing any of the above assays over a period of time, and evaluating the change in the level of the response (*i.e.*, the
10 amount of polypeptide or mRNA detected or, in the case of a skin test, the extent of the immune response detected). For example, the assays may be performed every month to every other month for a period of 1 to 2 years. In general, breast cancer is progressing in those patients in whom the level of the response increases over time. In contrast, breast cancer is not progressing when the signal detected either remains constant or
15 decreases with time.

In further aspects of the present invention, the compounds described herein may be used for the immunotherapy of breast cancer. In these aspects, the compounds (which may be polypeptides, antibodies or nucleic acid molecules) are preferably incorporated into pharmaceutical compositions or vaccines. Pharmaceutical
20 compositions comprise one or more such compounds and a physiologically acceptable carrier. Vaccines may comprise one or more polypeptides and an immune response enhancer, such as an adjuvant or a liposome (into which the compound is incorporated). Pharmaceutical compositions and vaccines may additionally contain a delivery system, such as biodegradable microspheres which are disclosed, for example, in U.S. Patent
25 Nos. 4,897,268 and 5,075,109. Pharmaceutical compositions and vaccines within the scope of the present invention may also contain other compounds, including one or more separate polypeptides.

Alternatively, a vaccine may contain DNA encoding one or more of the polypeptides as described above, such that the polypeptide is generated *in situ*. In such
30 vaccines, the DNA may be present within any of a variety of delivery systems known to those of ordinary skill in the art, including nucleic acid expression systems, bacteria and

viral expression systems. Appropriate nucleic acid expression systems contain the necessary DNA sequences for expression in the patient (such as a suitable promoter and terminating signal). Bacterial delivery systems involve the administration of a bacterium (such as *Bacillus-Calmette-Guerrin*) that expresses an immunogenic portion of the polypeptide on its cell surface. In a preferred embodiment, the DNA may be introduced using a viral expression system (e.g., vaccinia or other pox virus, retrovirus, or adenovirus), which may involve the use of a non-pathogenic (defective), replication competent virus. Techniques for incorporating DNA into such expression systems are well known to those of ordinary skill in the art. The DNA may also be "naked," as described, for example, in Ulmer et al., *Science* 259:1745-1749 (1993), and reviewed by Cohen, *Science* 259:1691-1692 (1993). The uptake of naked DNA may be increased by coating the DNA onto biodegradable beads, which are efficiently transported into the cells.

While any suitable carrier known to those of ordinary skill in the art may be employed in the pharmaceutical compositions of this invention, the type of carrier will vary depending on the mode of administration. For parenteral administration, such as subcutaneous injection, the carrier preferably comprises water, saline, alcohol, a fat, a wax or a buffer. For oral administration, any of the above carriers or a solid carrier, such as mannitol, lactose, starch, magnesium stearate, sodium saccharine, talcum, cellulose, glucose, sucrose, and magnesium carbonate, may be employed. Biodegradable microspheres (e.g., polylactate polyglycolate) may also be employed as carriers for the pharmaceutical compositions of this invention.

Any of a variety of adjuvants may be employed in the vaccines of this invention to nonspecifically enhance the immune response. Most adjuvants contain a substance designed to protect the antigen from rapid catabolism, such as aluminum hydroxide or mineral oil, and a stimulator of immune responses, such as lipid A, *Bordetella pertussis* or *Mycobacterium tuberculosis* derived proteins. Suitable adjuvants are commercially available as, for example, Freund's Incomplete Adjuvant and Complete Adjuvant (Difco Laboratories, Detroit, MI), Merck Adjuvant 65 (Merck and Company, Inc., Rahway, NJ), alum, biodegradable microspheres, monophosphoryl

lipid A and quil A. Cytokines, such as GM-CSF or interleukin-2, -7, or -12, may also be used as adjuvants.

The above pharmaceutical compositions and vaccines may be used, for example, for the therapy of breast cancer in a patient. As used herein, a "patient" refers to any warm-blooded animal, preferably a human. A patient may or may not be afflicted with breast cancer. Accordingly, the above pharmaceutical compositions and vaccines may be used to prevent the development of breast cancer or to treat a patient afflicted with breast cancer. To prevent the development of breast cancer, a pharmaceutical composition or vaccine comprising one or more polypeptides as described herein may be administered to a patient. Alternatively, naked DNA or plasmid or viral vector encoding the polypeptide may be administered. For treating a patient with breast cancer, the pharmaceutical composition or vaccine may comprise one or more polypeptides, antibodies or nucleotide sequences complementary to DNA encoding a polypeptide as described herein (*e.g.*, antisense RNA or antisense deoxyribonucleotide oligonucleotides).

Routes and frequency of administration, as well as dosage, will vary from individual to individual. In general, the pharmaceutical compositions and vaccines may be administered by injection (*e.g.*, intracutaneous, intramuscular, intravenous or subcutaneous), intranasally (*e.g.*, by aspiration) or orally. Between 1 and 10 doses may be administered for a 52-week period. Preferably, 6 doses are administered, at intervals of 1 month, and booster vaccinations may be given periodically thereafter. Alternate protocols may be appropriate for individual patients. A suitable dose is an amount of a compound that, when administered as described above, is capable of promoting an anti-tumor immune response. Such response can be monitored by measuring the anti-tumor antibodies in a patient or by vaccine-dependent generation of cytolytic effector cells capable of killing the patient's tumor cells *in vitro*. Such vaccines should also be capable of causing an immune response that leads to an improved clinical outcome (*e.g.*, more frequent remissions, complete or partial or longer disease-free survival) in vaccinated patients as compared to non-vaccinated patients. In general, for pharmaceutical compositions and vaccines comprising one or more polypeptides, the amount of each polypeptide present in a dose ranges from about

100 μ g to 5 mg. Suitable dose sizes will vary with the size of the patient, but will typically range from about 0.1 mL to about 5 mL.

The following Examples are offered by way of illustration and not by
5 way of limitation.

EXAMPLES

Example 1Preparation of Breast Tumor-Specific cDNAs Using Differential Display RT-PCR

5

This Example illustrates the preparation of cDNA molecules encoding breast tumor-specific polypeptides using a differential display screen.

A. Preparation of B18Ag1 cDNA and Characterization of mRNA Expression

10 Tissue samples were prepared from breast tumor and normal tissue of a patient with breast cancer that was confirmed by pathology after removal from the patient. Normal RNA and tumor RNA was extracted from the samples and mRNA was isolated and converted into cDNA using a (dT)₁₂AG (SEQ ID NO.:130) anchored 3' primer. Differential display PCR was then executed using a randomly chosen primer
15 (CTTCAACCTC) (SEQ ID NO.:103). Amplification conditions were standard buffer containing 1.5 mM MgCl₂, 20 pmol of primer, 500 pmol dNTP, and 1 unit of *Taq* DNA polymerase (Perkin-Elmer, Branchburg, NJ). Forty cycles of amplification were performed using 94°C denaturation for 30 seconds, 42°C annealing for 1 minute, and 72°C extension for 30 seconds. An RNA fingerprint containing 76 amplified products
20 was obtained. Although the RNA fingerprint of breast tumor tissue was over 98% identical to that of the normal breast tissue, a band was repeatedly observed to be specific to the RNA fingerprint pattern of the tumor. This band was cut out of a silver stained gel, subcloned into the T-vector (Novagen, Madison, WI) and sequenced.

The sequence of the cDNA, referred to as B18Ag1, is provided in SEQ
25 ID NO:1. A database search of GENBANK and EMBL revealed that the B18Ag1 fragment initially cloned is 77% identical to the endogenous human retroviral element S71, which is a truncated retroviral element homologous to the Simian Sarcoma Virus (SSV). S71 contains an incomplete *gag* gene, a portion of the *pol* gene and an LTR-like structure at the 3' terminus (*see* Werner et al., *Virology* 174:225-238 (1990)).
30 B18Ag1 is also 64% identical to SSV in the region corresponding to the P30 (*gag*) locus. B18Ag1 contains three separate and incomplete reading frames covering a

region which shares considerable homology to a wide variety of gag proteins of retroviruses which infect mammals. In addition, the homology to S71 is not just within the gag gene, but spans several kb of sequence including an LTR.

B18Ag1-specific PCR primers were synthesized using computer
5 analysis guidelines. RT-PCR amplification (94°C, 30 seconds; 60°C → 42°C, 30
seconds; 72°C, 30 seconds for 40 cycles) confirmed that B18Ag1 represents an actual
mRNA sequence present at relatively high levels in the patient's breast tumor tissue.
The primers used in amplification were B18Ag1-1 (CTG CCT GAG CCA CAA ATG)
(SEQ ID NO.:128) and B18Ag1-4 (CCG GAG GAG GAA GCT AGA GGA ATA)
10 (SEQ ID NO.:129) at a 3.5 mM magnesium concentration and a pH of 8.5, and
B18Ag1-2 (ATG GCT ATT TTC GGG GCC TGA CA) (SEQ ID NO.:126) and
B18Ag1-3 (CCG GTA TCT CCT CGT GGT TATT) (SEQ ID NO.:127) at 2 mM
magnesium at pH 9.5. The same experiments showed exceedingly low to nonexistent
levels of expression in this patient's normal breast tissue (*see* Figure 1). RT-PCR
15 experiments were then used to show that B18Ag1 mRNA is present in nine other breast
tumor samples (from Brazilian and American patients) but absent in, or at exceedingly
low levels in, the normal breast tissue corresponding to each cancer patient. RT-PCR
analysis has also shown that the B18Ag1 transcript is not present in various normal
tissues (including lymph node, myocardium and liver) and present at relatively low
20 levels in PBMC and lung tissue. The presence of B18Ag1 mRNA in breast tumor
samples, and its absence from normal breast tissue, has been confirmed by Northern
blot analysis, as shown in Figure 2.

The differential expression of B18Ag1 in breast tumor tissue was also
confirmed by RNase protection assays. Figure 3 shows the level of B18Ag1 mRNA in
25 various tissue types as determined in four different RNase protection assays. Lanes 1-
12 represent various normal breast tissue samples, lanes 13-25 represent various breast
tumor samples; lanes 26-27 represent normal prostate samples; lanes 28-29 represent
prostate tumor samples; lanes 30-32 represent colon tumor samples; lane 33 represents
normal aorta; lane 34 represents normal small intestine; lane 35 represents normal skin,
30 lane 36 represents normal lymph node; lane 37 represents normal ovary; lane 38
represents normal liver; lane 39 represents normal skeletal muscle; lane 40 represents a

first normal stomach sample, lane 41 represents a second normal stomach sample; lane 42 represents a normal lung; lane 43 represents normal kidney; and lane 44 represents normal pancreas. Interexperimental comparison was facilitated by including a positive control RNA of known B-actin message abundance in each assay and
5 normalizing the results of the different assays with respect to this positive control.

RT-PCR and Southern Blot analysis has shown the B18Ag1 locus to be present in human genomic DNA as a single copy endogenous retroviral element. A genomic clone of approximately 12-18 kb was isolated using the initial B18Ag1 sequence as a probe. Four additional subclones were also isolated by XbaI digestion.
10 Additional retroviral sequences obtained from the ends of the XbaI digests of these clones (located as shown in Figure 4) are shown as SEQ ID NO:3 - SEQ ID NO:10, where SEQ ID NO:3 shows the location of the sequence labeled 10 in Figure 4, SEQ ID NO:4 shows the location of the sequence labeled 11-29, SEQ ID NO:5 shows the location of the sequence labeled 3, SEQ ID NO:6 shows the location of the sequence
15 labeled 6, SEQ ID NO:7 shows the location of the sequence labeled 12, SEQ ID NO:8 shows the location of the sequence labeled 13, SEQ ID NO:9 shows the location of the sequence labeled 14 and SEQ ID NO:10 shows the location of the sequence labeled 11-22.

Subsequent studies demonstrated that the 12-18 kb genomic clone
20 contains a retroviral element of about 7.75 kb, as shown in Figures 5A and 5B. The sequence of this retroviral element is shown in SEQ ID NO: 141. The numbered line at the top of Figure 5A represents the sense strand sequence of the retroviral genomic clone. The box below this line shows the position of selected restriction sites. The arrows depict the different overlapping clones used to sequence the retroviral element.
25 The direction of the arrow shows whether the single-pass subclone sequence corresponded to the sense or anti-sense strand. Figure 5B is a schematic diagram of the retroviral element containing B18Ag1 depicting the organization of viral genes within the element. The open boxes correspond to predicted reading frames, starting with a methionine, found throughout the element. Each of the six likely reading frames is
30 shown, as indicated to the left of the boxes, with frames 1-3 corresponding to those found on the sense strand.

Using the cDNA of SEQ ID NO:1 as a probe, a longer cDNA was obtained (SEQ ID NO:227) which contains minor nucleotide differences (less than 1%) compared to the genomic sequence shown in SEQ ID NO:141.

5 B. Preparation of cDNA Molecules Encoding Other Breast Tumor-Specific Polypeptides

Normal RNA and tumor RNA was prepared and mRNA was isolated and converted into cDNA using a (dT)₁₂AG anchored 3' primer, as described above. Differential display PCR was then executed using the randomly chosen primers SEQ
 10 ID NO.: 87-125. Amplification conditions were as noted above, and bands observed to be specific to the RNA fingerprint pattern of the tumor were cut out of a silver stained gel, subcloned into either the T-vector (Novagen, Madison, WI) or the pCRII vector (Invitrogen, San Diego, CA) and sequenced. The sequences are provided in SEQ ID NO:11 - SEQ ID NO:86. Of the 79 sequences isolated, 67 were found to be novel
 15 (SEQ ID NO.:11-77) (*see also* Figures 6-20). Subsequent studies identified an additional 84 sequences (SEQ ID NOS:142-226), of which 72 appeared to be novel (SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227). To the best of the inventors' knowledge none of the previously identified sequences have heretofore been shown to be expressed at a
 20 greater level in human breast tumor tissue than in normal breast tissue.

Table I shows the level of representative breast tumor-specific transcripts present in normal breast tissue (columns BNI -BN7), breast tumor samples (columns BTI-BT12) and normal prostate, kidney, liver, lung, skin, small intestine, stomach, myocardium, lymph node, pancreas, skeletal muscle, ovary and aorta, as
 25 determined by RT-PCR analysis. A 0-3 grading scale for message abundance is used, with 0 denoting no detectable message and 3 a message level comparable to the control message (glyceraldehyde 3-phosphate dehydrogenase). The lack of data in a given box indicates that the tissue has not been tested for the presence or absence of that specific antigen.

TABLE I

CLONE	BN1	BN2	BN3	BN3	BN4	BN5	BN6	BN7	BT1	BT2	BT3	BT4	BT5	BT6	BT7	BT8	BT9	BT10	BT11	BT12
B2CA1							1					1								3
B2CA2							1					0								2
B3CA1							3					3								3
B3CA3c							0	0			0	0						0		1
B3CA3							1					1								2
B4CA1							0	0			0	0						0	0	2
B9CG1							0	0			0	0						0	1	2
B9CG3							0	0			0	0								
B11AG1		0	0	0	0	0			0	0	0	0	0	0	0	0				
B13AG1a							0	0				2								3
B13AG1b		2	2	2	2	2			2	2	2	2	2	2	2	2				
B13AG2		0	1	0					1	2	1	2	3	3	3	2				
B15AG1		0	1	0	0	1			2	3	2	2	3	3	3	0				
B17AG1																	2			
B18AG1a	1	0	0	0	0	0			3	3	2	3	3	3	2	3	3			
B16ACI-3		0	0	0	0	0			0	0	0	0	0	0	0	0				
B12CA1		0	1	2	2	2			2	1	2	0	3	0	2	2				
B12CA2		1	1	2	1	2			3	3	2	2	3	0	2	2				
B13CA1-36		0	0	0	0	2			1	1	1	0	2	1	3	2				
B13CA1-37		0	1	2	2	1			3	2	3	0	2	1	3	2				
B14CA1		0	0	1	0	0			2	2	3	0	2	1	2	2				
B16CA1		0	0	1	0	1			2	2	2	1	2	2	2	2				
B16GC2a									3	3		3	3		3		3	3	3	
B22GA2									0	1		1	0		1		2	1	0	
B34GA1		1	0			1			2		1	3	3			1	1	1	1	

CLONE	prostate	kidney	liver	lung	skin	sm. intestine	stomach	myocardium	lymph node	pancreas	skel. muscle	ovary	aorta
B2CA1													
B2CA2													
B3CA1													
B3CA3c													
B3CA3			0	0				0	0				
B4CA1													
B9CG1			1	0				0	0				
B9CG3			1	0				0	0				
B11AG1													
B13AG1a	0		0	0				0					
B13AG1b													
B13AG2													
B15AG1			0	3				0	0				
B17AG1					0	0			0				
B18AG1a	0	0	0	1	0	0	1			0	0	0	0
B16AC1-3													
B12CA1													
B12CA2													
B13CA1-36													
B13CA1-37													
B14CA1													
B16CA1													
B16GC2a	3	3	3	3	3	3	3						
B22GA2	0	0	0	1	0	0	0						
B34GA1		1	1	2	2	1	2						

Example 2

Preparation of B18Ag1 DNA from Human Genomic DNA

This Example illustrates the preparation of B18Ag1 DNA by
5 amplification from human genomic DNA.

B18Ag1 DNA may be prepared from 250 ng human genomic DNA using 20 pmol of B18Ag1 specific primers, 500 pmol dNTPS and 1 unit of *Taq* DNA polymerase (Perkin Elmer, Branchburg, NJ) using the following amplification parameters: 94°C for 30 seconds denaturing, 30 seconds 60°C to 42°C touchdown
10 annealing in 2°C increments every two cycles and 72°C extension for 30 seconds. The last increment (a 42°C annealing temperature) should cycle 25 times. Primers were selected using computer analysis. Primers synthesized were B18Ag1-1, B18Ag1-2, B18Ag1-3, and B18Ag1-4. Primer pairs that may be used are 1+3, 1+4, 2+3, and 2+4.

Following gel electrophoresis, the band corresponding to B18Ag1 DNA
15 may be excised and cloned into a suitable vector.

Example 3

Preparation of B18Ag1 DNA from Breast Tumor cDNA

20 This Example illustrates the preparation of B18Ag1 DNA by amplification from human breast tumor cDNA.

First strand cDNA is synthesized from RNA prepared from human breast tumor tissue in a reaction mixture containing 500 ng poly A+ RNA, 200 pmol of the primer (T)₁₂AG (*i.e.*, TTT TTT TTT TTT AG) (SEQ ID NO: 130), 1X first strand
25 reverse transcriptase buffer, 6.7 mM DTT, 500 mmol dNTPs, and 1 unit AMV or MMLV reverse transcriptase (from any supplier, such as Gibco-BRL (Grand Island, NY)) in a final volume of 30 µl. After first strand synthesis, the cDNA is diluted approximately 25 fold and 1 µl is used for amplification as described in Example 2. While some primer pairs can result in a heterogeneous population of transcripts, the
30 primers B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO: 126)

and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO: 127) yield a single 151 bp amplification product.

Example 4

5 Identification of B-cell and T-cell Epitopes of B18Ag1

This Example illustrates the identification of B18Ag1 epitopes.

The B18Ag1 sequence can be screened using a variety of computer algorithms. To determine B-cell epitopes, the sequence can be screened for
10 hydrophobicity and hydrophilicity values using the method of Hopp, *Prog. Clin. Biol. Res.* 172B:367-77 (1985) or, alternatively, Cease et al., *J. Exp. Med.* 164:1779-84 (1986) or Spouge et al., *J. Immunol.* 138:204-12 (1987). Additional Class II MHC (antibody or B-cell) epitopes can be predicted using programs such as AMPHI (e.g., Margalit et al., *J. Immunol.* 138:2213 (1987)) or the methods of Rothbard and Taylor
15 (e.g., *EMBO J.* 7:93 (1988)).

Once peptides (15-20 amino acids long) are identified using these techniques, individual peptides can be synthesized using automated peptide synthesis equipment (available from manufacturers such as Applied Biosystems, Inc., Foster City, CA) and techniques such as Merrifield synthesis. Following synthesis, the
20 peptides can be used to screen sera harvested from either normal or breast cancer patients to determine whether patients with breast cancer possess antibodies reactive with the peptides. Presence of such antibodies in breast cancer patient would confirm the immunogenicity of the specific B-cell epitope in question. The peptides can also be tested for their ability to generate a serologic or humoral immune in animals (mice, rats,
25 rabbits, chimps etc.) following immunization *in vivo*. Generation of a peptide-specific antiserum following such immunization further confirms the immunogenicity of the specific B-cell epitope in question.

To identify T-cell epitopes, the B18Ag1 sequence can be screened using different computer algorithms which are useful in identifying 8-10 amino acid motifs
30 within the B18Ag1 sequence which are capable of binding to HLA Class I MHC molecules. (see, e.g., Rammensee et al., *Immunogenetics* 41:178-228 (1995)).

Following synthesis such peptides can be tested for their ability to bind to class I MHC using standard binding assays (*e.g.*, Sette et al., *J. Immunol.* 153:5586-92 (1994)) and more importantly can be tested for their ability to generate antigen reactive cytotoxic T-cells following *in vitro* stimulation of patient or normal peripheral mononuclear cells using, for example, the methods of Bakker et al., *Cancer Res.* 55:5330-34 (1995); Visseren et al., *J. Immunol.* 154:3991-98 (1995); Kawakami et al., *J. Immunol.* 154:3961-68 (1995); and Kast et al., *J. Immunol.* 152:3904-12 (1994). Successful *in vitro* generation of T-cells capable of killing autologous (bearing the same Class I MHC molecules) tumor cells following *in vitro* peptide stimulation further confirms the immunogenicity of the B18Ag1 antigen. Furthermore, such peptides may be used to generate murine peptide and B18Ag1 reactive cytotoxic T-cells following *in vivo* immunization in mice rendered transgenic for expression of a particular human MHC Class I haplotype (Vitiello et al., *J. Exp. Med.* 173:1007-15 (1991)).

A representative list of predicted B18Ag1 B-cell and T-cell epitopes, broken down according to predicted HLA Class I MHC binding antigen, is shown below:

Predicted Th Motifs (B-cell epitopes) (SEQ ID NOS.: 131-133)

SSGGRTFDDFHRYLLVGI
QGAAQKPINLSKXIEVVQGHDE
SPGVFLEHLQEAYRIYTPFDLSA

Predicted HLA A2.1 Motifs (T-cell epitopes) (SEQ ID NOS.: 134-140)

YLLVGIQGA
GAAQKPINL
NLSKXIEVV
EVVQGHDES
HLQEAYRIY
NLA FVAQAA
FVAQAAPDS

Example 5Characterization of Breast Tumor Genes Discovered by Differential Display PCR

5 The specificity and sensitivity of the breast tumor genes discovered by differential display PCR were determined using RT-PCR. This procedure enabled the rapid evaluation of breast tumor gene mRNA expression semiquantitatively without using large amounts of RNA. Using gene specific primers, mRNA expression levels in a variety of tissues were examined, including 8 breast tumors, 5 normal breasts, 2
10 prostate tumors, 2 colon tumors, 1 lung tumor, and 14 other normal adult human tissues, including normal prostate, colon, kidney, liver, lung, ovary, pancreas, skeletal muscle, skin, stomach and testes.

To ensure the semiquantitative nature of the RT-PCR, β -actin was used as internal control for each of the tissues examined. Serial dilutions of the first strand
15 cDNAs were prepared and RT-PCR assays performed using β -actin specific primers. A dilution was then selected that enabled the linear range amplification of β -actin template, and which was sensitive enough to reflect the difference in the initial copy number. Using this condition, the β -actin levels were determined for each reverse transcription reaction from each tissue. DNA contamination was minimized by DNase
20 treatment and by assuring a negative result when using first strand cDNA that was prepared without adding reverse transcriptase.

Using gene specific primers, the mRNA expression levels were determined in a variety of tissues. To date 32 genes have been successfully examined by RT-PCR, three of which exhibit good specificity and sensitivity for breast tumors.
25 Figures 21A and 21B depict the results for these three genes: B15AG-1 (SEQ ID NO:27), B31GA1b (SEQ ID NO:148) and B38GA2a (SEQ ID NO. 157).

From the foregoing, it will be appreciated that, although specific embodiments of the invention have been described herein for the purpose of illustration, various modifications may be made without deviating from the spirit and
30 scope of the invention.

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Corixa Corporation

(ii) TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR THE
TREATMENT AND DIAGNOSIS OF BREAST CANCER

(iii) NUMBER OF SEQUENCES: 227

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: SEED and BERRY LLP

(B) STREET: 6300 Columbia Center, 701 Fifth Avenue

(C) CITY: Seattle

(D) STATE: Washington

(E) COUNTRY: USA

(F) ZIP: 98104-7092

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk

(B) COMPUTER: IBM PC compatible

(C) OPERATING SYSTEM: PC-DOS/MS-DOS

(D) SOFTWARE: PatentIn Release #1.0. Version #1.30

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER:

(B) FILING DATE: 10-JAN-1997

(C) CLASSIFICATION:

(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: Maki, David J.

(B) REGISTRATION NUMBER: 31.392

(C) REFERENCE/DOCKET NUMBER: 210121.419PC

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (206) 622-4900

(B) TELEFAX: (206) 682-6031

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 363 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 1..363

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

TTA	GAG	ACC	CAA	TTG	GGA	CCT	AAT	TGG	GAC	CCA	AAT	TTC	TCA	AGT	GGA	48
Leu	Glu	Thr	Gln	Leu	Gly	Pro	Asn	Trp	Asp	Pro	Asn	Phe	Ser	Ser	Gly	
1				5					10						15	
GGG	AGA	ACT	TTT	GAC	GAT	TTC	CAC	CGG	TAT	CTC	CTC	GTG	GGT	ATT	CAG	96
Gly	Arg	Thr	Phe	Asp	Asp	Phe	His	Arg	Tyr	Leu	Leu	Val	Gly	Ile	Gln	
			20					25						30		
GGA	GCT	GCC	CAG	AAA	CCT	ATA	AAC	TTG	TCT	AAG	GCG	ATT	GAA	GTC	GTC	144
Gly	Ala	Ala	Gln	Lys	Pro	Ile	Asn	Leu	Ser	Lys	Ala	Ile	Glu	Val	Val	
		35					40						45			
CAG	GGG	CAT	GAT	GAG	TCA	CCA	GGA	GTG	TTT	TTA	GAG	CAC	CTC	CAG	GAG	192
Gln	Gly	His	Asp	Glu	Ser	Pro	Gly	Val	Phe	Leu	Glu	His	Leu	Gln	Glu	
50						55					60					

GCT TAT CGG ATT TAC ACC CCT TTT GAC CTG GCA GCC CCC GAA AAT AGC 240
Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
65 70 75 80

CAT GCT CTT AAT TTG GCA TTT GTG GCT CAG GCA GCC CCA GAT AGT AAA 288
His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys
85 90 95

AGG AAA CTC CAA AAA CTA GAG GGA TTT TGC TGG AAT GAA TAC CAG TCA 336
Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser
100 105 110

GCT TTT AGA GAT AGC CTA AAA GGT TTT 363
Ala Phe Arg Asp Ser Leu Lys Gly Phe
115 120

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 121 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Leu Glu Thr Gln Leu Gly Pro Asn Trp Asp Pro Asn Phe Ser Ser Gly
1 5 10 15

Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val Gly Ile Gln
20 25 30

Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val
35 40 45

Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu
 50 55 60

Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
 65 70 75 80

His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys
 85 90 95

Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser
 100 105 110

Ala Phe Arg Asp Ser Leu Lys Gly Phe
 115 120

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1101 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

TCTTAGAATC TTCATACCCC GAACTCTTGG GAAAACCTTA ATCAGTCACC TACAGTCTAC	60
CACCCATTTA GGAGGAGCAA AGCTACCTCA GCTCCTCCGG AGCCGTTTTA AGATCCCCCA	120
TCTTCAAAGC CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC AGGTAAATGC	180
CAAAAAAGGT CCTAAACCCA GCCCAGGCCA CCGTCTCCAA GAAAACCTAC CAGGAGAAAA	240
GTGGGAAATT GACTTTACAG AAGTAAAACC ACACCGGGCT GGGTACAAAT ACCTTCTAGT	300

ACTGGTAGAC ACCTTCTCTG GATGGACTGA AGCATTTGCT ACCAAAAACG AAAGTGTCAA	360
TATGGTAGTT AAGTTTTTAC TCAATGAAAT CATCCCTCGA CGTGGGCTGC CTGTTGCCAT	420
AGGGTCTGAT AATGGAACGG CCTTCGCCTT GTCTATAGTT TAATCAGTCA GTAAGGCGTT	480
AAACATTCAA TGGAAGCTCC ATTGTGCCTA TCGACCCAGA GCTCTGGGCA AGTAGAACGC	540
ATGAACTGCA CCCTAAAAA ACACTCTTAC AAAATTAATC TTAAAAACCG GTGTTAATTG	600
TGTTAGTCTC CTTCCCTTAG CCCTACTTAG AGTTAAGGTG CACCCCTTAC TGGGCTGGGT	660
TCTTTACCTT TTGAAATCAT NTTTNGGAAG GGGCTGCCTA TCTTTNCTTA ACTAAAAAN	720
GCCCATTTGG CAAAAATTC NCAACTAATT TNTACGTNCC TACGTCTCCC CAACAGGTAN	780
AAAAATCTNC TGCCCTTTTC AAGGAACCAT CCCATCCATT CCTNAACAAA AGGCCTGCCN	840
TTCTTCCCC AGTTAACTNT TTTTNTTAA AATTCCCAA AAANGAACCN CCTGCTGGAA	900
AAACNCCCC CTCCAANCC CGGCCNAAGN GGAAGGTTCC CTTGAATCCC NCCCCNCNA	960
ANGGCCCCGA ACCNTTAAAN TNGTTCNNG GGGTNNGGCC TAAAGNCCN ATTTGGTAAA	1020
CCTANAAATT TTTTCTTTN TAAAAACCAC NNTTTNNTT TTCTTAAACA AAACCCTNTT	1080
TNTAGNANCN TATTTCCNC C	1101

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1087 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

TCTAGAGCTG CGCCTGGATC CCGCCACAGT GAGGAGACCT GAAGACCAGA GAAAACACAG	60
CAAGTAGGCC CTTTAAACTA CTCACCTGTG TTGTCTTCTA ATTTATTCTG TTTTATTTTG	120
TTTCCATCAT TTTAAGGGGT TAAATCATC TTGTCAGAC CTCAGCATAT AAAATGACCC	180
ATCTGTAGAC CTCAGGCTCC AACCATACCC CAAGAGTTGT CTGGTTTTGT TTAAATTACT	240
GCCAGGTTTC AGCTGCAGAT ATCCCTGGAA GGAATATTCC AGATTCCCTG AGTAGTTTCC	300
AGGTAAAT CCTATAGGCT TCTTCTGTTT TGAGGAAGAG TTCCTGTCAG AGAAAAACAT	360
GATTTTGAT TTTTAACTTT AATGCTGTG AAACGCTATA AAAAAATTT TCTACCCCTA	420
GCTTTAAAGT ACTGTTAGTG AGAAATTAATTCCTTCAG GAGGATTAAA CTGCCATTTT	480
AGTTACCCTA ATTCCAAATG TTTTGGTGGT TAGAATCTTC TTAAATGTTT TTGAAGAAGT	540
GTTTTATATT TTCCCATCNA GATAAATTCT CTCNCNCCTT NNTTTNTNT CTNNTTTTTT	600
AAAACGGANT CTGCTCCGT TGTCCANGCT GGAATTTT TTTTGGCCAA TCTCCGCTNC	660
CTTGCAANAA TNCTGCNTCC CAAAATTACC NCCTTTTCC CACCTCCACC CCNNGGAATT	720
ACCTGGAATT ANAGGCCCC NCCCCCCCC CGGCTAATTT GTTTTGTGTT TTAGTAAAAA	780
ACGGGTTTCC TGTTTTAGTT AGGATGGCCC ANNTCTGACC CCNTNATCNT CCCCCTCNGC	840
CCTCNAATNT TNGGNNTANG GCTTACCCCC CCCNGNNGTT TTTCTCCAT TNAATTTTC	900
TNTGGANTCT TGAATNCGG GTTTTCCCTT TTAAACCNAT TTTTTTTTN NNNCCCCAN	960

TTTTNCCTCC CCCNTNTNTA ANGGGGGTTT CCCAANCCGG GTCCNCCCCC ANGTCCCCA 1020

TTTTTCTCCC CCCCCCTCTT TTTTCTTTNC CCCAAAANTC CTATCTTTTC CTNNAAATAT 1080

CNANTNT 1087

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1010 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

TCTAGACCAA GAAATGGGAG GATTTTAGAG TGA CTGATGA TTTCTCTATC ATCTGCAGTT 60

AGTAAACATT CTCCACAGTT TATGCAAAAA GTAACAAAAC CACTGCAGAT GACAAACACT 120

AGGTAACACA CATACTATCT CCCAAATACC TACCCACAAG CTCAACAATT TTAAACTGTT 180

AGGATCACTG GCTCTAATCA CCATGACATG AGGTCACCAC CAAACCATCA AGCGCTAAAC 240

AGACAGAATG TTTCCACTCC TGATCCACTG TGTGGGAAGA AGCACCGAAC TTACCCACTG 300

GGGGGCCTGC NTCANAANAA AAGCCCATGC CCCC GG GTNT NCCTTTNAAC CGGAACGAAT 360

NAACCCACCA TCCCCACANC TCCTCTGTTC NTGGGCCCTG CATCTTGTGG CCTCNTNTNC 420

TTTNGGGGAN ACNTGGGGAA GGTACCCCAT TTCNTTGACC CCNCNANAAA ACCCCNGTGG 480

CCCTTTGCCC TGATTNCNT GGGCCTTTTC TCTTTCCCT TTTGGGTTGT TTAAATTCCC 540

AATGTCCCN GAACCCTCTC CNTNCTGCC AAAACCTACC TAAATTNCTC NCTANGNNTT 600

TTCTTGGTGT TNCTTTTCAA AGGTNACCTT NCCTGTTTCA NCCCNACNAA AATTNTTCC	660
NTATNNTGGN CCCNAAAAA NNNATCENNCC CNAATTGCCC GAATTGGTTN GGTTTTTCCT	720
NCTGGGGGAA ACCCTTTAAA TTTCCCCCTT GGCCGGCCCC CCTTTTTTCC CCCCTTTNGA	780
AGGCAGGNGG TTCTTCCCGA ACTTCCAATT NCAACAGCCN TGCCCATTTG TGAACCCTT	840
TTCCTAAAAT TAAAAAATAN CCGGTTNNGG NNGGCCTCTT TCCCCTCCNG GNGGGNNGNG	900
AAANTCCTTA CCCCNAAAAA GGTGCTTAG CCCCNGTCC CCACTCCCCC NGGAAAAATN	960
AACCTTTTCN AAAAAAGGAA TATAANTTTN CCACTCCTTN GTTCTCTTCC	1010

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 950 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

TCTAGAGCTC GCGGCCGCGA GCTCTAATAC GACTCACTAT AGGGCGTCGA CTCGATCTCA	60
GCTCACTGCA ATCTCTGCCC CCGGGGTCAT GCGATTCTCC TGCCTCAGCC TTCCAAGTAG	120
CTGGGATTAC AGGCGTGCAA CACCACACCC GGCTAATTTT GTATTTTAA TAGAGATGGG	180
GTTTTCCCTT GTTGGCCANN ATGGTCTCNA ACCCCTGACC TCNNGTGATC CCCCNCCCN	240
NGANCTCNA CTGCTGGGGA TNNCCGNNNN NNNCCTCCN NCNCNNNNNN NCNCNNTCCN	300

TNNTCCTTNC TCNNNNNNNN CNNTCNNTCC NNCTTCTCNC CNNNTNTTNT CNNCNCNCNN	360
CNNCCNCNT NCCCNCCNNT TCNCNTNCNN TNTCCNNCNC NNTCNCNCNN CNNNCNTNN	420
CCNNTACNTC NTNNNCNNNT CCNTCTNTNN CCTCNCNCNT CNETCNCNT TNTCTCCTCN	480
NTNNNNNNCT CCNNNNNTCT CNETCNCNCN TNCCTCNNTN NCCNCNCCCC NCCTCNCNC	540
CTNNTTTNNN CNNCNCNTCC NTNCCNTTCN NNTCCNNTNN CNNCNCNCN NNCNTTNTTC	600
CCNCCNNTTC CTTNCNCNTN NNTNTCNCNN CNCNTCNTC NTTTNCCTCT NNNTCCCNC	660
TCNNTTCNCC CNNNTCCNCC CCCCNCCTNT CTCTCNCNCN NNTNNNTNTN NNCNTCCNC	720
TNTCNCNTTC NTCNNTNCNT TNCNTCNCN NNCNNTNCNC TNCNTNTNT CTNNTCNCN	780
TCNCNTNTCN CCNTCCNTTN CTNTCTCCTN TNTCCTTCCC CTCNCCTNCT CTTTCNCNC	840
CCNNTNTNTN TNNCNCNNT NCTNNCNCNC CNETNTTTCN TCTCTNCTNN NNNTNCCCTC	900
NNCCNTNCC CTNNTCNCCT NCTNNTACCN TNCNTCTCCN TCTCCTTCC	950

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1086 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

TCTAGAGCTC GCGGCCGCGA GCTCAATTAA CCCTCACTAA AGGGAGTCGA CTCGATCAGA	60
CTGTTACTGT GTCTATGTAG AAAGAAGTAG ACATAAGAGA TTCCATTTTG TTCTGTACTA	120

AGAAAAATTC TTCTGCCTTG AGATGCTGTT AATCTGTAAC CCTAGCCCCA ACCCTGTGCT 180

CACAGAGACA TGTGCTGTGT TGA CTCAAGG TTCAATGGAT TTAGGGCTAT GCTTTGTAA 240

AAAAGTGCTT GAAGATAATA TGCTTGTTAA AAGTCATCAC CATTCTCTAA TCTCAAGTAC 300

CCAGGGACAC AATACACTGC GGAAGGCCGC AGGGACCTCT GTCTAGGAAA GCCAGGTATT 360

GTCCAAGATT TCTCCCCATG TGATAGCCTG AGATATGGCC TCATGGGAAG GGTAAGACCT 420

GA CTGTCCCC CAGCCCGACA TCCCCAGCC CGACATCCCC CAGCCCGACA CCCGAAAAGG 480

GTCTGTGCTG AGGAAGATTA NTAAAAGAGG AAGGCTCTTT GCATTGAAGT AAGAAGAAGG 540

CTCTGTCTCC TGCTCGTCCC TGGGCAATAA AATGTCTTGG TGTAAACCC GAATGTATGT 600

TCTACTTACT GAGAATAGGA GAAAACATCC TTAGGGCTGG AGGTGAGACA CCCTGGCGGC 660

ATACTGCTCT TTAATGCACG AGATGTTTGT NTAA TTGCCA TCCAGGGCCA NCCCCTTTCC 720

TTAACTTTTT ATGANACAAA AACTTTGTTT NCTTTTCCTG CGAACCTCTC CCCCTATTAN 780

CCTATTGGCC TGCCCATCCC CTCCCCAAAN GGTGAAAANA TGTT CNTAAA TNCGAGGGAA 840

TCCAAAACNT TTTCCCGTTG GTCCCTTTT CAACCCCGTC CCTGGGCCNN TTTCTCCCC 900

AACNTGTCCC GGNTCCTTCN TTCCCNCCCC CTCCCNGAN AAAAAACCC GTNTGANGGN 960

GGCCCTCAA ATTATAACCT TTCCNAAACA AANNGGTCN AAGGTGGTTT GNTTCCGGTG 1020

CGGCTGGCCT TGAGGTCCCC CTNCACCCC AATTGGAAN CCNGTTTTTT TTATTGCCCN 1080

NTCCCC 1086

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1177 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

NCCNTTTAGA TGTGACAAN NTAACAAGC NGCTCAGGCA GCTGAAAAA GCCACTGATA	60
AAGCATCCTG GAGTATCAGA GTTTACTGTT AGATCAGCCT CATTTGACTT CCCCTCCAC	120
ATGGTGTTTA AATCCAGCTA CACTACTTCC TGA CTCAAAC TCCACTATTC CTGTT CATGA	180
CTGTCAGGAA CTGTTGAAA CTA CTGAAAC TGGCCGACCT GATCTTCAA ATGTGCCCT	240
AGGAAAGGTG GATGCCACCG TGTCACAGA CAGTACCNCC TTCCTCGAGA AGGGACTACG	300
AGGGGCCGGT GCANCTGTTA CCAAGGAGAC TNATGTGTTG TGGGCTCAGG CTTTACCANC	360
AAACACCTCA NCNCNNAAGG CTGAATTGAT CGCCCTCACT CAGGCTCTCG GATGGGGTAA	420
GGGATATTAA CGTTAACT GACAGCAGGT ACGCCTTTGC TACTGTGCAT GTACGTGGAG	480
CCATCTACCA GGAGCGTGGG CTA CTCACTC GGCAGGTGGC TGTNATCCAC TGTAANGGA	540
CATCAAAGG AAAACNNGC TGTTGCCCGT GGTAACCANA AANCTGATCN NCAGCTCNAA	600
GATGCTGTGT TGACTTTCAC TCNCNCCTCT TAACTTGCT GCCACANTC TCCTTTCCCA	660
ACCAGATCTG CCTGACAATC CCCATACTCA AAAAAAAAAAN AANACTGGCC CCGAACCNA	720
ACCAATAAAA ACGGGGANGG TNGGTNGANC NNCCTGACCC AAAATAATG GATCCCCCGG	780

GCTGCAGGAA TTCAATTCAN CCTATCNAT ACCCCCAACN NGGNGGGGGG GGCCNGTNCC	840
CATTNCCCCT NTATTNATTC TTTNNCCCCC CCCCCGGCNT CCTTTTNNAA CTCGTGAAAG	900
GGAAACCTG NCTTACCAAN TTATCNCCTG GACCNCCCC TTCCNCGGTN GNTTANAAAA	960
AAAAGCCNC ANTCCNTCC NAAATTTGCA CNGAAAGNA AGGAATTTAA CCTTTATTTT	1020
TTNNTCCTTT ANTTGTNNN CCCCCTTTTA CCCAGGCGAA CNGCCATCNT TTAANAAAAA	1080
AAANAGAANG TTTATTTTTC CTTNGAACCA TCCCAATANA AANCACCCGC NGGGGAACGG	1140
GGNGGNAGGC CNCTACCCC CTTTNTGTNG GNGGGNC	1177

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1146 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

NCCNNTNNT GATGTTGTCT TTTTGGCCTC TCTTTGATA CTTTCCCTCT CTCAGAGGT	60
GAAAAGGGTC AAAAGGAGCT GTTGACAGTC ATCCAGGTG GGCCAATGTG TCCAGAGTAC	120
AGACTCCATC AGTGAGGTCA AAGCCTGGGG CTTTTCAGAG AAGGGAGGAT TATGGGTTTT	180
CCAATTATAC AAGTCAGAAG TAGAAGAAG GGACATAAAC CAGGAAGGGG GTGGAGCACT	240
CATCACCCAG AGGGACTTGT GCCTCTCTCA GTGGTAGTAG AGGGGCTACT TCCTCCCACC	300
ACGGTTGCAA CCAAGAGGCA ATGGGTGATG AGCCTACAGG GGACATANCC GAGGAGACAT	360

GGGATGACCC TAAGGGAGTA GGCTGGTTTT AAGGCGGTGG GACTGGGTGA GGGAACTCT	420
CCTCTTCTTC AGAGAGAAGC AGTACAGGGC GAGCTGAACC GGCTGAAGGT CGAGGCGAAA	480
ACACGGTCTG GCTCAGGAAG ACCTTGAAG TAAATTATG AATGGTGCAT GAATGGAGCC	540
ATGGAAGGGG TGCTCCTGAC CAACTCAGC CATTGATCAA TGTTAGGGAA ACTGATCAGG	600
GAAGCCGGGA ATTCATTAA CAACCCGCCA CACAGCTTGA ACATTGTGAG GTTCAGTGAC	660
CCTTCAAGGG GCCACTCCAC TCCAACTTTG GCCATTCTAC TTTGCNAAAT TTCCAAAAC	720
TCCTTTTTTA AGGCCGAATC CNTANTCCCT NAAAAACNAA AAAAACTG CNCCTATTCT	780
GGAAAAGGCC CANCCCTTAC CAGGCTGGAA GAAATTTTNC CTTTTTTTTT TTTTGAAGG	840
CNTTTNTTAA ATTGAACCTN AATTCNCCCC CCCAAAAAA AACCNCNCNG GGGGCGGAT	900
TTCCAAAAC NAATTCCTT ACCAAAAAC AAAAACCCNC CCTTNTTCCC TTCNCCTN	960
TTCTTTTAAT TAGGGAGAGA TNAAGCCCC CAATTTCCNG GNCTNGATNN GTTCCCCC	1020
CCCCATTTT CCNAACTTT TTCCANCNA GGAANCCNC CTTTTTTNG GTCNGATTNA	1080
NCAACCTCC AAACATTTT TCCNNAAAA NTTGNTNGG NGGGAAAAAN ACCTNNTTTT	1140
ATAGAN	1146

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 545 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

CTTCATTGGG TACGGGCCCC CTCGAGGTCG ACGGTATCGA TAAGCTTGAT ATCGAATTCC	60
TGCAGCCCGG GGGATCCACT AGTTCTAGAG TCAGGAAGAA CCACCAACCT TCCTGATTTT	120
TATTGGCTCT GAGTTCTGAG GCCAGTTTTC TTCTTCTGTT GAGTATGCGG GATTGTCAGG	180
CAGATCTGGC TGTGAAAGG AGACTGTGGG CAGCAAGTTT AGAGGCGTGA CTGAAAGTCA	240
CACTGCATCT TGAGCTGCTG AATCAGCTTT CTGGTTACCA CGGGCAACAG CCGTGTTTTC	300
CTTTTGATGT CCTTACAGT GGATTACAGC CACCTGCTGA GGTGAGTAGC CCACGCTCCT	360
GGTAGATGGC TCCACGTACA TGCACAGTAG CAAAGGCGTA CCTGCTGTCA GTGTTAACGT	420
TAATATCCTT ACCCATCGG AGAGCCTGAG TGAGGGCGAT CAATTCAGCC CTTTGTGCT	480
GAGGTGTTTG CTGGTTAAGC CCTGAACCCA CAACACATCT GTCTCCATGG TAACAGCTGC	540
ACCGG	545

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 196 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

TCTCCTAGGC TGGGCACAGT GGCTCATACC TGTAATCCTG ACCGTTTCAG AGGCTCAGGT	60
---	----

GGGGGATCG CTTGAGCCCA AGATTCAAG ACTAGTCTGG GTAACATAGT GAGACCCTAT 120
CTCTACGAAA AAATAAAAAA ATGAGCCTGG TGTAGTGGCA CACACCAGCT GAGGAGGGAG 180
AATCGAGCCT AGGAGA 196

(2) INFORMATION FOR SEQ ID NO:12:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 388 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

TCTCCTAGGC TTGGGGGCTC TGACTAGAAA TTCAAGGAAC CTGGGATTCA AGTCCAAC TG 60
TGACACCAAC TTACTGTG GNCTCCAATA AACTGCTTCT TTCCTATTCC CTCTCTATTA 120
AATAAATAA GGAAAACGAT GTCTGTGTAT AGCCAAGTCA GNTATCCTAA AAGGAGATAC 180
TAAGTGACAT TAAATATCAG AATGTAAAAC CTGGGAACCA GGTCCCAGC CTGGGATTAA 240
ACTGACAGCA AGAAGACTGA ACAGTACTAC TGTGAAAAGC CCGAAGNGGC AATATGTTCA 300
CTCTACCGTT GAAGGATGGC TGGGAGAATG AATGCTCTGT CCCCAGTCC CAAGCTCACT 360
TACTATACCT CCTTTATAGC CTAGGAGA 388

(2) INFORMATION FOR SEQ ID NO:13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 337 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

TAGTAGTTGC CTATAATCAT GTTTCATT ATTTTCACAT TTTATTAACC AATTTCTGTT	60
TACCCTGAAA AATATGAGGG AAATATATGA AACAGGGAGG CAATGTTTCAG ATAATTGATC	120
ACAAGATATG ATTTCTACAT CAGATGCTCT TTCCTTTCCT GTTTATTTCC TTTTATTTTC	180
GGTTGTGGGG TCGAATGTAA TAGCTTTGTT TCAAGAGAGA GTTTTGGCAG TTTCTGTAGC	240
TTCTGACACT GCTCATGTCT CCAGGCATCT ATTTGCACTT TAGGAGGTGT CGTGGGAGAC	300
TGAGAGGTCT ATTTTTTCCA TATTGGGCA ACTACTA	337

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 571 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

TAGTAGTTGC CACACAGTGC CTTTCATTT ATTTAACCCC CACCTGAACG GCATAAACTG	60
AGTGTTTCAGC TGGTGTTTTT TACTGTAAAC AATAAGGAGA CTTTGCTCTT CATTTAAACC	120
AAAATCATAT TTCATATTTT ACGCTCGAGG GTTTTACCG GTTCCTTTTT ACACTCCTTA	180

AAACAGTTT TAAGTCGTT GGAACAAGAT ATTTTCTT TCCTGGCAGC TTTAACATT	240
ATAGCAAATT TGTGTCTGG GACTGCTGG TACTGTTT TCACAGTTGC AATCAAGGC	300
ATTGCAACC AAGAAAAA AATTTTTTG TTTATTTGA AACTGGACCG GATAACGGT	360
GTTTGGAGCG GCTGCTGAT ATAGTTTAA ATGGTTTATT GCACCTCCTT AAGTTGCACT	420
TATGTGGGG GGGNTTTTG NATAGAAAGT NTTANTCAC ANAGTCACAG GACTTTTNT	480
CTTTGGNNA CTGAGCTAAA AAGGGCTGNT TTCGGGTGG GGCAGATGA AGGCTCACAG	540
GAGGCCTTC TCTTAGAGGG GGGAACNCT A	571

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 548 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

TATATATTA ATAACTAAA TATATTTGA TCACCCACTG GGGTGATAAG ACAATAGATA	60
TAAAAGTATT TCCAAAAAGC ATAAACCAA AGTATCATAC CAAACCAAT TCATACTGCT	120
TCCCCACCC GCACTGAAAC TTCACCTTCT AACTGTCTAC CTAACCAAT TCTACCCTTC	180
AAGTCTTTGG TCGTGCTCA CTA CTCTTTT TTTTTTTTT TTTNTTTTGG AGATGGAGTC	240
TGGCTGTGCA GCCCAGGGT GGAGTACAAT GGCACAACCT CAGCTCACTG NAACCTCCGC	300
CTCCAGGTT CATGAGATTC TCCTGNTTCA GCCTTCCCAG TAGCTGGGAC TACAGGTGTG	360

CATCACCATG CCTGGNTAAT CTTTTTTNGT TTTNGGGTAG AGATGGGGGT TTTACATGTT 420
GGCCAGGNTG GTNTCGAACT CCTGACCTCA AGTGATCCAC CCACCTCAGG CTCCCAAAGT 480
GCTAGGATTA CAGACATGAG CCACTGNGCC CAGNCCTGGT GCATGCTCAC TTCTCTAGGC 540
AACTACTA 548

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 638 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

TTCCGTTATG CACATGCAGA ATATTCTATC GGTACTTCAG CTATTACTCA TTTTGATGGC 60
GCAATCCGAG CCTATCCTCA AGATGAGTAT TTAGAAAGAA TTGATTTAGC GATAGACCAA 120
GCTGGTAAGC ACTCTGACTA CACGAAATTG TTCAGATGTG ATGGATTTAT GACAGTTGAT 180
CTTTGGAAGA GATTATTAAG TGATTATTTT AAAGGGAATC CATTAATTCC AGAATATCTT 240
GGTTTAGCTC AAGATGATAT AGAAATAGAA CAGAAAGAGA CTACAAATGA AGATGTATCA 300
CCAACTGATA TTGAAGAGCC TATAGTAGAA AATGAATTAG CTGCATTAT TAGCCTTACA 360
CATAGCGATT TTCCTGATGA ATCTTATATT CAGCCATCGA CATAGCATT CCTGATGGGC 420
AACCTTACGA ATAATAGAAA CTGGGTGCGG GGCTATTGAT GAATTCATCC NCAGTAAATT 480

TGGATATNAC AAAATATAAC TCGATTGCAT TTGGATGATG GAATACTAAA TCTGGCAAAA 540
GTAACCTTTGG AGCTACTAGT AACCTCTCTT TTTGAGATGC AAAATTTTCT TTTAGGGTTT 600
CTTATTCTCT ACTTTACGGA TATTGGAGCA TAACGGGA 638

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 286 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

ACTGATGGAT GTCGCCGGAG GCGAGGGGCC TTATCTGATG CTCGGCTGCC TGTCGTGAT 60
GTGCGCGGCG ATTGGGCTGT TTATCTCAA CACCGCCACG GCGGTGCTGA TGGCGCCTAT 120
TGCCTTAGCG GCGGCGAAGT CAATGGGCGT CTCACCCTAT CCTTTTGCCA TGGTGGTGGC 180
GATGGCGGCT TCGGCGGCGT TTATGACCCC GGTCTCCTCG CCGGTTAACA CCCTGGTGCT 240
TGGCCCTGGC AAGTACTCAT TTAGCGATTT TGTCAAATA GGCCTG 286

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 262 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

TCGGTCATAG CAGCCCCTTC TTCTCAATTT CATCTGTCAC TACCCTGGTG TAGTATCTCA	60
TAGCCTTACA TTTTATAGC CTCCTCCCTG GTCTGTCTTT TGATTTTCCT GCCTGTAATC	120
CATATCACAC ATAAGTCAA GTAAACATTT CTAAAGTGTG GTTATGCTCA TGCTACTCCT	180
GTGNCAAGAA ATAGTTTCCA TTACCGTCTT AATAAAATTC GGATTGTTC TTTNCTATTN	240
TCACTCTTCA CCTATGACCG AA	262

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 261 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

TCGGTCATAG CAAAGCCAGT GGTTTGAGCT CTCTACTGTG TAAACTCCTA AACCAAGGCC	60
ATTTATGATA AATGGTGGCA GGATTTTAT TATAACATG TACCCATGCA AATTCCTAT	120
AACTCTGAGA TATATTCTTC TACATTTAAA CAATAAAAT AATCTATTTT TAAAAGCCTA	180
ATTTGCGTAG TTAGGTAAGA GTGTTTAATG AGAGGTATA AGGTATAAAT CACCAGTCAA	240
CGTTTCTCTG CCTATGACCG A	261

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 294 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

TACAACGAGG CGACGTCGGT AAAATCGGAC ATGAAGCCAC CGCTGGTCTT TTCGTCCGAG	60
CGATAGGCGC CGGCCAGCCA GCGGAACGGT TGCCCGGATG GCGAAGCGAG CCGGAGTTCT	120
TCGGACTGAG TATGAATCTT GTTGTGAAAA TACTCGCCGC CTTCGTTCGA CGACGTCGCG	180
TCGAAATCTT CGANCTCCTT ACGATCGAAG TCTTCGTGGG CGACGATCGC GGTCAATTCC	240
GCCCCACCGA AATCATGGTT GAGCCGGATG CTGNCCCCGA AGNCCTCGTT TGTN	294

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 208 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

TTGGTAAAGG GCATGGACGC AGACGCCTGA CGTTTGGCTG AAAATCTTTC ATTGATTCGT	60
ATCAATGAAT AGGAAAATTC CCAAAGAGGG AATGTCCTGT TGCTCGCCAG TTTTNTGT	120
GTTCTCATGG ANAAGGCAAN GAGCTCTTCA GACTATTGGN ATTNTCGTTC GGTCTTCTGC	180
CAACTAGTCG NCTTGCNANG ATCTTCAT	208

(2) INFORMATION FOR SEQ ID NO:22:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 287 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

NCCNTTGAGC TGAGTGATTG AGATNTGTAA TGGTTGTAAG GGTGATTCAG GCGGATTAGG	60
GTGGCGGGTC ACCCGGCAGT GGGTCTCCCG ACAGGCCAGC AGGATTGGG GCAGGTACGG	120
NGTGCGCATC GCTCGACTAT ATGCTATGGC AGGCGAGCCG TGAAGGNGG ATCAGGTCAC	180
GGCGCTGGAG CTTTCCACGG TCCATGNATT GNGATGGCTG TTCTAGGCGG CTGTTGCCAA	240
GCGTGATGGT ACGCTGGCTG GAGCATTGAT TTCTGGTGCC AAGGTGG	287

(2) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 204 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

TTGGGTAAAG GGAGCAAGGA GAAGGCATGG AGAGGCTCAN GCTGGTCCTG GCCTACGACT	60
GGGCAAGCT GTCGCCGGGG ATGGTGGAGA ACTGAAGCGG GACCTCCTCG AGGTCCTCCG	120

NCGTTACTTC NCCGTCCAGG AGGAGGGTCT TTCCGTGGTC TNGGAGGAGC GGGGGGAGAA 180

GATNCTCCTC ATGGTCNACA TCCC 204

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 264 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

TGGATTGGTC AGGAGCGGGT AGAGTGGCAC CATTGAGGGG ATATTCAAAA ATATTATTTT 60

GTCCTAAATG ATAGTTGCTG AGTTTTTCTT TGACCCATGA GTTATATTGG AGTTTATTTT 120

TTAACTTTCC AATCGCATGG ACATGTTAGA CTTATTTTCT GTTAATGATT NCTATTTTTA 180

TTAAATTGGA TTTGAGAAAT TGGTTNTTAT TATATCAATT TTTGGTATTT GTTGAGTTTG 240

ACATTATAGC TTAGTATGTG ACCA 264

(2) INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 376 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

TTACAACGAG GGGAACTCC GTCTCTACAA AAATTAATAA ATTAGCCAGG TGTGGTGGTG	60
TGCACCCGCA ATCCCAGCTA CTTGGGAGGT TGAGACACAA GANTCACCTA NATGTGGGAG	120
GTCAAGGTTG CATGAGTCAT GATTGTGCCA CTGCACTCCA GCCTGGGTGA CAGACCGAGA	180
CCCTGCCTCA ANAGANAANG AATAGGAAGT TCAGAAATCN TGGNTGTGGN GCCCAGCAAT	240
CTGCATCTAT NCAACCCCTG CAGGCAANGC TGATGCAGCC TANGTTCAAG AGCTGCTGTT	300
TCTGGAGGCA GCAGTTNGGG CTTCCATCCA GTATCACGGC CACACTCGCA CNAGCCATCT	360
GTCTCCGTN TGTNAC	376

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 372 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

TTACAACGAG GGGAACTCC GTCTCTACAA AAATTAATAA ATTAGCCAGG TGTGGTGGTG	60
TGCACCTGTA ATCCCAGCTA CTTGGGCGGC TGAGACACAA GAACCACCTA AATGTGGGAG	120
GGTCAAGGTT GCATGAGTCA TGATCGCGCC ACTGCACTCC AGCCTGGGTG ACAGACTGAG	180
ACCCTGCCTC AAAAGAAAAA GAATAGGAAG TTCAGAAACC CTGGGTGTGG NGCCAGCAA	240
TCTGCATTTA AACAATCCCT GCAGGCAATG CTGATGCAGC CTAAGTTCAA GAGCTGCTGT	300

TCTGGAGGCA GNAGTAAGGG CTTCCATCCA GCATCACGGN CAACACTGCA AAAGCACCTG 360

TCCTCGTTGG TA 372

(2) INFORMATION FOR SEQ ID NO:27:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 477 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

TTCTGTCCAC ATCTACAAGT TTTATTTATT TTGTGGGTTT TCAGGGTGAC TAAGTTTTTC 60

CCTACATTGA AAAGAGAAGT TGCTAAAAGG TGCACAGGAA ATCATTTTTT TAAGTGAATA 120

TGATAATATG GGTCCGTGCT TAATACAAC T GAGACATATT TGTTCTCTGT TTTTITAGAG 180

TCACCTCTTA AAGTCCAATC CCACAATGGT GAAAAAAAA TAGAAAGTAT TTGTCTACC 240

TTTAAGGAGA CTGCAGGGAT TCTCCTTGAA AACGGAGTAT GGAATCAATC TTAAATAAAT 300

ATGAAATTGG TTGGTCTTCT GGGATAAGAA ATTCCCAACT CAGTGTGCTG AAATTCACCT 360

GACTTTTTTT GGGAAAAAAT AGTCGAAAAT GTCAATTTGG TCCATAAAAT ACATGTTACT 420

ATTAAAAGAT ATTTAAAGAC AAATTCTTTC AGAGCTCTAA GATTGGTGTG GACAGAA 477

(2) INFORMATION FOR SEQ ID NO:28:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 438 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

TCTNCAACCT CTTGANTGTC AAAAACCTTN TAGGCTATCT CTAAAAGCTG ACTGGTATTC	60
ATTCCAGCAA AATCCCTCTA GTTTTGGAG TTTCCTTTTA CTATCTGGGG CTGCCTGAGC	120
CACAAATGCC AAATTAAGAG CATGGCTATT TTCGGGGGCT GACAGGTCAA AAGGGGTGTA	180
AATCCGATAA GCCTCCTGGA GGTGCTCTAA AAACACTCCT GGTGACTCAT CATGCCCTG	240
GAGCACTTCA ATCGNCTTAG ACAAGTTTAT AGGTTTCTGG GCAGCTCCCT GAATACCCAC	300
GAGGAGATAC CGGTGGAAAT CGTCAAAAGT TCTCCCTCCA CTTGAGAAAT TTGGGTCCCA	360
ATTAGGTCCC AATTGGGTCT CTAATCACTA TTCCTCTAGC TTCCTCCTCC GGNCTATTGG	420
TTGATGTGAG GTTGAAGA	438

(2) INFORMATION FOR SEQ ID NO:29:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 620 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

AAGAGGTAC CAGCCCCAAG CCTTGACAAC TTCCATAGGG TGCAAGCCT GTGGGTGCAC	60
AGAAGTCAAA AATTGAGTTT TGGGATCCTC AGCCTAGATT TCAGAGGATA TAAAGAAACA	120

60

CCTAACACCT AGATATTCAG ACAAAAGTTT ACTACAGGGA TGAAGCTTTC ACGGAAAACC 180
TCTACTAGGA AAGTACAGAA GAGAAATGTG GGTTCGGAGC CCCC AACAG AATCCCCTCT 240
AGAACTGC CTAATGAAAC TGTGAGAAGA TGGCCACTGT CATCCAGACA CCAGAATGAT 300
AGACCCACCA AAACTTATG CCATATTGCC TATAAACCT ACAGACACTC AATGCCAGCC 360
CCATGAAAAA AAACTGAGA AGAAGACTGT NCCCTACAAT GCCACCGGAG CAGAACTGCC 420
CCAGGCCATG GAAGCACAGC TCTTATATCA ATGTGACCTG GATGTTGAGA CATGGAATCC 480
NANGAAATCN TTTTAANACT TCCACGGTTN AATGACTGCC CTATTANATT CNGAACTTAN 540
ATCCNGGCCT GTGACCTCTT TGCTTTGGCC ATTCCCCTT TTTGGAATGG CTNTTTTTTT 600
CCCATGCCTG TNCCCTCTTA 620

(2) INFORMATION FOR SEQ ID NO:30:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 100 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

TTACAACGAG GGGGTCAATG TCATAAATGT CACAATAAAA CAATCTCTTC TTTTTTTTTT 60
TTTTTTTTTT TTTTTTTTTT TTTTTTTTTT TTTTTTTTTT 100

(2) INFORMATION FOR SEQ ID NO:31:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 762 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

TAGTCTATGC GCCGGACAGA GCAGAATTAA ATTGGAAGTT GCCCTCCGGA CTTTCTACCC	60
ACACTCTTCC TGAAAAGAGA AAGAAAAGAG GCAGGAAAGA GGTTAGGATT TCATTTTCAA	120
GAGTCAGCTA ATTAGGAGAG CAGAGTTTAG ACAGCAGTAG GCACCCCATG ATACAAACCA	180
TGGACAAAGT CCCTGTTTAG TAACTGCCAG ACATGATCCT GCTCAGGTTT TGAAATCTCT	240
CTGCCCATAA AAGATGGAGA GCAGGAGTGC CATCCACATC AACACGTGTC CAAGAAAGAG	300
TCTCAGGGAG ACAAGGGTAT CAAAAACAA GATTCTTAAT GGAAGGAAA TCAAACCAA	360
AAATTAGATT TTTCTCTACA TATATATAAT ATACAGATAT TTAACACATT ATTCCAGAGG	420
TGGCTCCAGT CCTTGGGGCT TGAGAGATGG TGAAAACTTT TGTTCACAT TAACTTCTGC	480
TCTCAAATTC TGAAGTATAT CAGAATGGGA CAGGCAATGT TTTGCTCCAC ACTGGGGCAC	540
AGACCCAAAT GGTTCGTGC CCGAAGAAGA GAAGCCCGAA AGACATGAAG GATGCTTAAG	600
GGGGGTGGG AAAGCCAAAT TGGTANTATC TTTTCTCCT GCCTGTGTTT CNGAAGTCTC	660
CNCTGAAGGA ATTCTTAAAA CCCTTTGTGA GGAAATGCCC CTTACCATG ACAANTGGTC	720
CCATTGCTTT TAGGGNGATG GAAACACCAA GGGTTTGTAT CC	762

(2) INFORMATION FOR SEQ ID NO:32:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 276 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

TAGTCTATGC GTGTATTAAC CTCCCCTCCC TCAGTAACAA CCAAAGAGGC AGGAGCTGTT	60
ATTACCAACC CCATTTTACA GATGCATCAA TAATGACAGA GAAGTGAAGT GACTTGCGCA	120
CACAACCAGT AAATTGGCAG AGTCAGATT GAATCCATGG AGTCTGGTCT GCACTTTCAA	180
TCACCGAATA CCCTTTCTAA GAAACGTGTG CTGAATGAGT GCATGGATAA ATCAGTGTCT	240
ACTCAACATC TTTGCCTAGA TATCCCGCAT AGACTA	276

(2) INFORMATION FOR SEQ ID NO:33:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 477 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

TAGTAGTTGC CAAATATTG AAAATTACC CAGAAGTGAT TGAAAACTTT TTGGAAACAA	60
AAACAAATAA AGCCAAAAGG TAAAATAAAA ATATCTTTGC ACTCTCGTTA TTACCTATCC	120
ATAACTTTTT CACCGTAAGC TCTCCTGCTT GTTAGTGTAG TGTGGTTATA TTAACTTTT	180

TAGTTATAT TTTTATTCA CTTTCCACT AGAAAGTCAT TATTGATTTA GCACACATGT 240
TGATCTCATT TCATTTTTTC TTTTATAGG CAAAATTGTA TGCTATGCAA CAAAAATACT 300
CAAGCCCAT ATCTTTTTTC CCCCCGAAAT CTGAAAATTG CAGGGGACAG AGGGAAGTTA 360
TCCCATTAAA AAATTGTAAA TATGTTCACT TTATGTTTAA AAATGCACAA AACATAAGAA 420
AATTGTGTTT ACTTGAGCTG CTGATTGTAA GCAGTTTAT CTCAGGGGCA ACTACTA 477

(2) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 631 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

TAGTAGTTGC CAATTCAGAT GATCAGAAAT GCTGCTTCC TCAGCATTGT CTTGTAAAC 60
CGCATGCCAT TTGGAACCTT GGCAGTGAGA AGCCAAAAGG AAGAGGTGAA TGACATATAT 120
ATATATATAT ATTCAATGAA AGTAAAATGT ATATGCTCAT ATACTTTCTA GTTATCAGAA 180
TGAGTTAAGC TTTATGCCAT TGGGCTGCTG CATATTTTAA TCAGAAGATA AAAGAAAATC 240
TGGGCATTTT TAGAATGTGA TACATGTTTT TTAAAACTG TTAAATATTA TTTCGATATT 300
TGTCTAAGAA CCGGAATGTT CTTAAAATTT ACTAAACAG TATTGTTTGA GGAAGAGAAA 360
ACTGTACTGT TTGCCATTAT TACAGTCGTA CAAGTGCATG TCAAGTCACC CACTCTCTCA 420

GGCATCAGTA TCCACCTCAT AGCTTTACAC ATTTTGACGG GGAATATTGC AGCATCCTCA 480
GGCCTGACAT CTGGGAAAGG CTCAGATCCA CCTACTGCTC CTTGCTCGTT GATTGTTTT 540
AAAATATTGT GCCTGGTGTC ACTTTTAAGC CACAGCCCTG CCTAAAAGCC AGCAGAGAAC 600
AGAACCCGCA CCATTCTATA GGCAACTACT A 631

(2) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 578 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

TAGTAGTTGC CATCCCATAT TACAGAAGGC TCTGTATACA TGACTTATTT GGAAGTGATC 60
TGTTTTCTCT CCAAACCCAT TTATCGTAAT TTCACCAGTC TTGGATCAAT CTTGGTTTCC 120
ACTGATACCA TGAAACCTAC TTGGAGCAGA CATTGCACAG TTTTCTGTGG TAAAACTAA 180
AGGTTTATTT GCTAAGCTGT CATCTTATGC TTAGTATTTT TTTTACAG TGGGAATTG 240
CTGAGATTAC ATTTTGTTAT TCATTAGATA CTTGGGATA ACTTGACACT GTCTTCTTTT 300
TTTCGCTTTT AATTGCTATC ATCATGCTTT TGAACAAGA ACACATTAGT CCTCAAGTAT 360
TACATAAGCT TGCTTGTTAC GCCTGGTGGT TTAAAGGACT ATCTTTGGCC TCAGGTTTAC 420
AAGAATGGGC AAAGTGTTC CTTATGTTCT GTAGTTCTCA ATAAAAGATT GCCAGGGGCC 480
GGGTACTGTG GCTCGCACTG TAATCCCAGC ACTTTGGGAA GCTGAGGCTG GCGGATCATG 540

TTAGGGCAGG TGTCGAAAC CAGCCTGGGC AACTACTA

578

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 583 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

TAGTAGTTGC CTGTAATCCC AGCAACTCAG GAGGCTGGGG CAGGAGAATC AGTTGAACCT	60
GGGAGGCAGA AGTTGTAATT AGCAAAGATC GCACCATTGC ACTTCAGCCT GGGCAACAAG	120
AGTGAGATTC CATCTCAAAA ACAAAAAAAAA GAAAAAGAAA AGAAAAGGAA AAAACGTATA	180
AACCCAGCCA AAACAAAATG ATCATTCTTT TAATAAGCAA GACTAATTTA ATGTGTTTAT	240
TTAATCAAAG CAGTTGAATC TTCTGAGTTA TTGGTGAAAA TACCCATGTA GTTAATTTAG	300
GGTTCTTACT TGGGTGAACG TTTGATGTTT ACAGGTTATA AAATGGTTAA CAAGGAAAAT	360
GATGCATAAA GAATCTTATA AACTACTAAA AATAAATAAA ATATAAATGG ATAGGTGCTA	420
TGGATGGAGT TTTTGTGTAA TTAAAAATCT TGAAGTCATT TTGGATGCTC ATTGGTTGTC	480
TGGTAATTTT CATTAGGAAA AGGTTATGAT ATGGGGAAAC TGTTTCTGGA AATTGCGGAA	540
TGTTTCTCAT CTGTAAAATG CTAGTATCTC AGGGCAACTA CTA	583

(2) INFORMATION FOR SEQ ID NO:37:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 716 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

GATCTACTAG TCATNTGGAT TCTATCCATG GCAGCTAAGC CTTTCTGAAT GGATTCTACT	60
GCTTTCTTGT TCTTTAATCC AGACCCTTAT ATATGTTTAT GTTCACAGGC AGGGCAATGT	120
TTAGTGAAAA CAATTCIAAA TTTTATTTT TGCATTTTCA TGCTAATTC CGTCACACTC	180
CAGCAGGCTT CCTGGGAGAA TAAGGAGAAA TACAGCTAAA GACATTGTCC CTGCTTACTT	240
ACAGCCTAAT GGTATGCAAA ACCACTTCAA TAAAGTAACA GGAAAAGTAC TAACCAGGTA	300
GAATGGACCA AAAGTGATAT AGAAAAATCA GAGGAAGAGA GGAACAAATA TTTACTGAGT	360
CCTAGAATGT ACAAGGCTTT TTAATTACAT ATTTTATGTA AGGCCTGCAA AAAACAGGTG	420
AGTAATCAAC ATTTGTCCCA TTTTACATAI AAGGAACTG AAGCTTAAAT TGAATAATTT	480
AATGCATAGA TTTTATAGTT AGACCATGTT CAGGTCCTTA TGTTATACTT ACTAGCTGTA	540
TGAATATGAG AAAATAATTT TGTTATTTTC TTGGCATCAG TATTTTCATC TGCAAAATAA	600
AGCTAAAGTT ATTTAGCAAA CAGTCAGCAT AGTGCCTGAT ACATAGTAGG TGCTCCAAAC	660
ATGATTACNC TANTATNGG TATTANAAAA ATCCAATATA GGCNTGGATA AAACCG	716

(2) INFORMATION FOR SEQ ID NO:38:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 688 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

TTCTGTCCAC ATATCATCCC ACTTTAATTG TTAATCAGCA AAAC TTTC AA TGAAAAATCA	60
TCCATTTTAA CCAGGATCAC ACCAGGAAAC TGAAGGTGTA TTTT TTTT TA CCTTAAAAAA	120
AAAAAAAAA ACCAAACAAA CAAAAACAGA TTAACAGCAA AGAGTTCTAA AAAATTTACA	180
TTTCTCTTAC AACTGTCATT CAGAGAACAA TAGTTCTTAA GTCTGT TAAA TCTTGGCATT	240
AACAGAGAAA CTTGATGAAN AGTTGTACTT GGAATATTGT GGATTT TTTT TTTTGTCTAA	300
TCTCCCCCTA TTGTTT TGCC AACAGTAATT TAAGTTTG TG TGGAACATCC CCGTAGTTGA	360
AGTGTAACAA ATGTATAGGA AGGAATATAT GATAAGATGA TGCATCACAT ATGCATTACA	420
TGTAGGGACC TTCACA ACTT CATGCACTCA GAAACATGC TTGAAGAGGA GGAGAGGACG	480
GCCCAGGGTC ACCATCCAGG TGCCTTGAGG ACAGAGAATG CAGAAGTGGC ACTGTTGAAA	540
TTTAGAAGAC CATGTGTGAA TGGTTTCAGG CCTGGGATGT TTGCCACCAA GAAGTGCCTC	600
CGAGAAATTT CTTTCCCAT TGAATACAG GGTGGCTTGA TGGGTACGGT GGGTGACCCA	660
ACGAAGAAAA TGAAATTCTG CCCTTTCC	688

(2) INFORMATION FOR SEQ ID NO:39:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 585 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

TAGTAGTTGC CGCNNACCTA AAANTTGGAA AGCATGATGT CTAGGAAACA TANTAAAATA	60
GGGTATGCCT ATGTGCTACA GAGAGATGTT AGCATTTAAA GTGCATANTT TTATGTATTT	120
TGACAAATGC ATATNCCTCT ATAATCCACA ACTGATTACG AAGCTATTAC AATTAAAAAG	180
TTTGGCCGGG CGTGGTGGGC GGTGGCTGAC GCCTGTAATC CCAGCACTTT GGGAGGCCGA	240
GGCACGCGGA TCACGAGGTC GGGAGTTCAA GACCATCCTG GCTAACACGG TGAAAGTCCA	300
TCTCTACTAA AAATACGAAA AAATTACCCC GCGGTGGTGG CGGGCGCCTG TAGTCCCAGC	360
TACTCCGGAG GCTGAGGCAG GAGAATGGCG TGAACCCAGG ACACGGAGCT TGCAGTGTGC	420
CAACATCAG TCACTGCCCT CCAGCCTGGG GGACAGGAAC AAGANTCCCG TCCTCANAAA	480
AGAAAAATAC TACTNATANT TTCNACTTTA TTTAANTTA CACAGAACTN CCTCTTGGTA	540
CCCCCTTACC ATTCATCTCA CCCACCTCCT ATAGGGCACN NCTAA	585

(2) INFORMATION FOR SEQ ID NO:40:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 475 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

TCTGTCCACA CCAATCTTAG AAGCTCTGAA AAGAATTGT CTTTAAATAT CTTTAAATAG	60
TAACATGTAT TTTATGGACC AAATTGACAT TTTGACTGT TTTTCCAAA AAAGTCAGGT	120
GAATTCAGC AACTGAGTT GGAATTTCT TATCCCAGAA GACCAACCA TTTTCATATT	180
ATTTAAGATT GATTCCATAC TCCGTTTCA AGGAGAATCC CTGCAGTCTC CTAAAGGTA	240
GAACAAATAC TTCCTATTTT TTTTCACCA TTGTGGGATT GGACTTTAAG AGGTGACTCT	300
AAAAAACAG AGAACAAATA TGTCTCAGTT GTATTAAGCA CGGACCCATA TTATCATATT	360
CACTTAAAAA AATGATTTC TGTGCACCTT TTGGCAACTT CTCTTTTCAA TGTAGGGAAA	420
AACTTAGTCA CCCTGAAAAC CCACAAAATA AATAAACTT GTAGATGTGG ACAGA	475

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 423 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

TAAGAGGGTA CATCGGGTAA GAACGTAGGC ACATCTAGAG CTTAGAGAAG TCTGGGGTAG	60
GAAAAAATC TAAGTATTTA TAAGGGTATA GGTAACATTT AAAAGTAGGG CTAGCTGACA	120
TTATTTAGAA AGAACACATA CGGAGAGATA AGGGCAAAGG ACTAAGACCA GAGGAACACT	180
AATATTTAGT GATCACTTCC ATTCTTGGA AAAATAGTAA CTTTAAAGTT AGCTTCAAGG	240

AAGATTTTGG GCCATGATTA GTTGTCAAAA GTTAGTTCTC TTGGGTTTAT ATTACTAATT 300
TTGTTTAAAG ATCCTTGTTA GTGCTTTAAT AAAGTCATGT TATATCAAAC GCTCTAAAAC 360
ATTGTAGCAT GTTAAATGTC ACAATATACT TACCATTGTG TGTATATGGC TGTACCCTCT 420
CTA 423

(2) INFORMATION FOR SEQ ID NO:42:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 527 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

TCTCCTAGGC TAATGTGTGT GTTCTGTAA AAGTAAAAAG TTAAAAATTT TAAAAATAGA 60
AAAAAGCTTA TAGAATAAGA ATATGAAGAA AGAAATATT TTTGTACATT TGCACAATGA 120
GTTTATGTTT TAAGCTAAGT GTTATTACAA AAGAGCCAAA AAGGTTTTAA AAATTAAAC 180
GTTTGTAAG TTACAGTACC CTTATGTAA TTTATAATTG AAGAAAGAAA AACTTTTTTT 240
TATAAATGTA GTGTAGCCTA AGCATACAGT ATTTATAAAG TCTGGCAGTG TTCAATAATG 300
TCCTAGGCCT TCACATTCAC TACTGACTC ACCCAGAGCA ACTTCCAGTC CTGTAAGCTC 360
CATTCGTGGT AAGTGCCCTA TACAGGTGCA CCATTTATTT TACAGTATTT TTACTGTACC 420
TTCTCTATGT TTCCATATGT TTCGATATAC AAATACCACT GGTACTATN GCCCNACAGG 480

TAATTCCAGT AACACGGCCT GTATACGTCT GGTANCCCTA GNGAAGA

527

(2) INFORMATION FOR SEQ ID NO:43:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 331 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

TCTTCAACCT CGTAGGACAA CTCTCATATG CCTGGGCACT ATTTTtaggt TACTACCTTG	60
GCTGCCCTTC TTAAAGAAA AAAAAAGAAG AAAAAAGAAC TTTCCACAA GTTCTCTTC	120
CTCTAGTTGG AAAATTAGAG AAATCATGTT TTAAATTTG TGTTATTTC GATCACAAAT	180
TCAAACACTT GTAAACATTA AGCTTCTGTT CAATCCCCTG GGAAGAGGAT TCATTCTGAT	240
ATTTACGGTT CAAAAGAAGT TGTAATATTG TGCTTGAAC ACAGAGAACC AGTTATTAAC	300
TTCCTACTAC TATTATATAA TAAATAATAA C	331

(2) INFORMATION FOR SEQ ID NO:44:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 592 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

GGCTTAGTAG TTGCCAGGCA AAATARCGTT GATTCTCCTC AGGAGCCACC CCCAACACCC	60
CTGTTTGCTT CTAGACCTAT ACCTAGACTA AAGTCCCAGC AGACCCCTAG AGGTGAGGTT	120
CAGAGTGACC CTTGAGGAGA TGTGCTACAC TAGAAAAGAA CTGCTTGAGT TTTCTAATTT	180
ATATAAGCAG AAATCTGGAG AAGAGTCATA GGAATGGATA TTAAGGGTGT GAGATAATGG	240
CGGAAGGAAT ATAGAGTTGG ATCAGGCTGG ACTTATTGAT TTGAACCCAC TAAGTAGAGA	300
TTCTGCTTTT GATGTTGCAG CTCAGGGAGT TAAAAAAGGT TTTAATGGTT CTAATAGTTT	360
ATTTGCTTGG TTAGCTGAAA TATGGATAAA AGATGGCCCA CTGTGAGCAA GCTGGAAATG	420
CCTGATCTCT CTCAGTTTAA TGTAAGGAA GGGATCCAAA AGTTTAGGGA GANTTGGATG	480
CTGGRAKTGG ATTGGTCACT TTGRGACCTA CCCWTCCCAG CTGGGAGGGT CCAGAAGATA	540
CACCCTTGAC CAACGCTTTG CGAAATGGAT TTGTGATGGC GGCAACTACT AA	592

(2) INFORMATION FOR SEQ ID NO:45:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 567 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

GGCTTAGTAG TTGCCATTGC GAGTGCTTGC TCAACGAGCG TTGAACATGG CGGATTGTCT	60
AGATTCAACG GATTTGAGTT TTACCAGCAA AGCGAACCAA GCGCGGCCCA GAGAATTATG	120
GGTTGGTTGG CTTTGAAAAG ATGGAAATCC TGTAAGCCTA GTCAGAAAAG CCTTCTTGCA	180

GAACAGTTGG TTCTCGGGCG AACGCTCATC AAGATGCCCA TTGGAAAGGC TAGCGTGTAT 240
TTGGGAGAGC CTGATAGCGT GTCTTCTGAT GATGTTTGTG CTTGGACAGT GACAAAAGAT 300
ATGCAAAGCA AGTCCGAAC TACGCTCAAG CTCGTGAGC AAATTATTGT AGACTCCTAC 360
TTTACTGTG AGGAATGATA GCCAAGGGTG GGGACTTTAA GACTAAGGTG GTTTGTACTT 420
GCGCCGATGA TCCCAGGCAG AAAGAMCTGA TCGCTAGTTT TATACGGGCA ACTACTAAGC 480
CGAATTCCAG CACACTGGCG GCCGTTACTA ATTGGATCCG ANCTCGGTAC CAGCTTGATG 540
CATASCTTGA GTTWTCTATA NTGTCNC 567

(2) INFORMATION FOR SEQ ID NO:46:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 908 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

GAGCGAAAGA CCGAGGGCAG NGNNTANGNG CGANGAAGCG GAGAGGGCCA AAAAGCAACC 60
GCTTTCCCG GGGGTGCCG ATTCATTAAG GCAGGTGGAG GACAGGTTTC CCGATGGAAG 120
GCGGCAGGGG CGCAAGCAAT TAATGTGAGT AGGCCATTCA TTAGCACCCG GGCTTAACAT 180
TTAAGCTTCG GGTGTGTATG TGGTGGGAAT TGTGAGCGGA TAACAATTC ACACAGGAAA 240
CAGCTATGAC CATGATTACG CCAAGCTATT TAGGTGACAT TATAGAATAA CTCAAGTTAT 300

GCATCAAGCT TGGTACCGAG TTCGGATCCA CTAGTAACGG CCGCCAGTGT GTGGAATTCG 360
GCTTAGTAGT TGCCGACCAT GGAGTGCTAC CTAGGCTAGA ATACCTGAGY TCCTCCCTAG 420
CCTCACTCAC ATTAAATTGT ATCTTTTCTA CATTAGATGT CCTCAGCGCC TTATTTCTGC 480
TGGACWATCG ATAAATTAAT CCTGATAGGA TGATAGCAGC AGATTAATTA CTGAGAGTAT 540
GTTAATGTGT CATCCCTCCT ATATAACGTA TTTGCATTTT AATGGAGCAA TTCTGGAGAT 600
AATCCCTGAA GGCAAAGGAA TGAATCTTGA GGGTGAGAAA GCCAGAATCA GTGTCCAGCT 660
GCAGTTGTGG GAGAAGGTGA TATTATGTAT GTCTCAGAAG TGACACCATA TGGGCAACTA 720
CTAAGCCCGA ATTCCAGCAC ACTGGCGGGC GTTACTAATG GATCCGAGCT CGGTACCAAG 780
CTTGATGCAT AGCTTGAGTA TCTATAGTGT CACTAAATAG CCTGGCGTTA TCATGGTCAT 840
AGCTGTTTCC TGTGTGAAAT TGTATCCGC TCCCAATTCC CCCCACCATA CGAGCCGGAA 900
CATAAAGT 908

(2) INFORMATION FOR SEQ ID NO:47:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 480 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

TGCCAACAAG GAAAGTTTAA AATTCCCTCT TGAGGATTCT TGGTGATCAT CAAATTCAGT 60
GGTTTTTAAG GTTGTCTTCT GTCAAATAAC TCTAACTTTA AGCCAAACAG TATATGGAAG 120

CACAGATAKA ATATTACACA GATAAAAGAG GAGTTGATCT AAAGTARAGA TAGTTGGGG 180
CTTTAATTC TGGACCTAG GTCTCCCAT CTCTTCTGT GCTGAGGAAC TTCTTGAAG 240
CGGGGATTCT AAAGTCTTT GGAAGACAGT TTGAAAACCA CCATGTTGT CTCAGTACCT 300
TTATTTTAA AAAGTAGGTG AACATTTGA GAGAGAAAAG GGCTTGGTTG AGATGAAGTC 360
CCCCCCCC CTTTTTTT TTTAGCTGA AATAGATACC CTATGTTNAA RGAARGGATT 420
ATTATTTACC ATGCCAYTAR SCACATGCTC TTTGATGGG NYCTCCSTAC CCTCCTTAAG 480

(2) INFORMATION FOR SEQ ID NO:48:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 591 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

AAGAGGTAC CGAGTGAAT TTCCGCTCA CTAGTCTGGT GTGGCTAGTC GGTTCGTGG 60
TGGCCAACAT TACGAATTC CAACTCAACC GTTCTTGGAC GTTCAAGCGG GAGTACCGC 120
GAGGATGGTG GCGTGAATTC TGGCCTTCT TTGCCGTGGG ATCGGTAGCC GCCATCATCG 180
GTATGTTTAT CAAGATCTTC TTTACTAACC CGACCTCTCC GATTTACCTG CCCGAGCCGT 240
GGTTTAACGA GGGGAGGGGG ATCCAGTCAC GCGAGTACTG GTCCCAGATC TTCGCCATCG 300
TCGTGACAAT GCCTATCAAC TTCGTCGTCA ATAAGTTGTG GACCTTCCGA ACGGTGAAGC 360

ACTCCGAAAA CGTCCGGTGG CTGCTGTGCG GTGACTCCCA AAATCTTGAT AACAAACAAGG 420
TAACCGAATC GCGCTAAGGA ACCCCGGCAT CTCGGGTACT CTGCATATGC GTACCCCTTA 480
AGCCGAATTC CAGCACACTG GCGGCCGTTA CTAATTGGAT CCGAACTCCG TAACCAAGCC 540
TGATGCGTAA CTTGAGTTAT TCTATAGTGT CCCTAAAATA ACCTGGCGTT A 591

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 454 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

AAGAGGGTAC CTGCCTTGAA ATTTAAATGT CTAAGGAAAR TGGGAGATGA TTAAGAGTTG 60
GTGTGGCYTA GTCACACCAA AATGTATTTA TTACATCCTG CTCCTTTCTA GTTGACAGGA 120
AAGAAAGCTG CTGTGGGGAA AGGAGGGATA AATACTGAAG GGATTTACTA AACAAATGTC 180
CATCACAGAG TTTTCCTTTT TTTTITTTTG AGACAGAGTC TTGCTCTGTC ACCCAGGCTG 240
GAATGAAGWG GTATGATCTC AGTTGAATGC AACCTCTACC TCCTAGGTTC AAGCGATTCT 300
CATGCCTCAG CCTCCTGAGC AGCTGGGACT ATAGGCGCAT GCTACCATGC CAGGCTAATT 360
TTTATATTTT TATTAGAGAC GGGGTGTTGC CATGTTGGCC AGGCAGGTCT CGAACTCCTG 420
GGCCTCAGAT GATCTGCCCC ACCGTACCCT CTTA 454

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 463 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

AAGAGGGTAC CAAAAAAG AAAAAGGAAA AAAAGAAAA CAACTTGTAT AAGGCTTTCT	60
GCTGCATACA GCTTTTTTTT TTAAATAAA TGGTGCCAAC AAATGTTTT GCATTCACAC	120
CAATTGCTGG TTTTGAAATC GTACTCTTCA AAGGTATTG TGCAGATCAA TCCAATAGTG	180
ATGCCCCGTA GGTTTTGTGG ACTGCCACG TTGTCTACCT TCTCATGTAG GAGCCATTGA	240
GAGACTGTTT GGACATGCCT GTGTTTATGT AGCCGTGATG TCCGGGGGCC GTGTACATCA	300
TGTTACCGTG GGGTGGGGTC TGCATTGGCT GCTGGGCATA TGGCTGGGTG CCCATCATGC	360
CCATCTGCAT CTGCATAGGG TATTGGGGCG TTTGATCCAT ATAGCCATGA TTGCTGTGGT	420
AGCCACTGTT CATCATTGGC TGGGACATGC TGTTACCCTC TTA	463

(2) INFORMATION FOR SEQ ID NO:51:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 399 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

CTTCAACCTC CCAAAGTGCT GGGATTACAG GACTGAGCCA CCACGCTCAG CCTAAGCCTC	60
TTTTTCACTA CCCTCTAAGC GATCTACCAC AGTGATGAGG GGCTAAAGAG CAGTGCAATT	120
TGATTACAAT AATGGAACCT AGATTTATTA ATTAACAATT TTTCCTTAGC ATGTTGGTTC	180
CATAATTATT AAGAGTATGG ACTTACTTAG AAATGAGCTT TCATTTTAAG AATTCATCT	240
TTGACCTTCT CTATTAGTCT GAGCAGTATG ACACTATACG TATTTTATTT AACTAACCTA	300
CCTTGAGCTA TTACTTTTTA AAAGGCTATA TACATGAATG TGTATTGTCA ACTGTAAAGC	360
CCCACAGTAT TTAATTATAT CATGATGTCT TTGAGGTTG	399

(2) INFORMATION FOR SEQ ID NO:52:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 392 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

CTTCAACCTC AATCAACCTT GGTAATTGAT AAAATCATCA CTTAACTTTC TGATATAATG	60
GCAATAATTA TCTGAGAAAA AAAAGTGGTG AAAGATTAAA CTTGCATTTC TCTCAGAATC	120
TTGAAGGATA TTTGAATAAT TCAAAAGCGG AATCAGTAGT ATCAGCCGAA GAACTCACT	180
TAGCTAGAAC GTTGACCCA TGGATCTAAG TCCCTGCCCT TCCACTAACC AGCTGATTGG	240
TTTTGTGTAA ACCTCCTACA CGCTGGGCT TGGTCGCCTC ATTTGTCAAA GTAAAGGCTG	300

AAATAGGAAG ATAATGAACC GTGTCTTTTT GGTCTCTTTT CCATCCATTA CTCTGATTTT 360

ACAAAGAGGC CTGTATTCCC CTGGTGAGGT TG 392

(2) INFORMATION FOR SEQ ID NO:53:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 179 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:53:

TTCGGGTGAT GCCTCCTCAG GCTACAGTGA AGACTGGATT ACAGAAAGGT GCCAGCGAGA 60

TTTCAGATTC CTGTAAACCT CTAAAGAAAA GGAGTCGCGC CTCAACTGAT GTAGAAATGA 120

CTAGTTCAGC ATACNGAGAC ACNTCTGACT CCGATTCTAG AGGACTGAGT GACCTGCAN 179

(2) INFORMATION FOR SEQ ID NO:54:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 112 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:54:

TTCGGGTGAT GCCTCCTCAG GCTACATCAT NATAGAAGCA AAGTAGAANA ATCNGTTTG 60

TGCATTTTCC CACANACAAA ATTCAAATGA NTGGAAGAAA TTGGGANAGT AT 112

(2) INFORMATION FOR SEQ ID NO:55:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 225 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:55:

TGAGCTTCG CTCTGACAA CTCAATAGAT AATCAAAGGA CAACTTTAAC AGGGATTCAC	60
AAAGGAGTAT ATCCAAATGC CAATAAACAT ATAAAAAGGA ATTCAGCTTC ATCATCATCA	120
GAAGWATGCA AATTAAAACC ATAATGAGAA ACCACTATGT CCCACTAGAA TAGATAAAAT	180
CTTAAAGAC TGGTAAAACC AAGTGTGGT AAGGCAAGAG GAGCA	225

(2) INFORMATION FOR SEQ ID NO:56:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 175 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:56:

GCTCCTCTTG CCTTACCAAC ACATTCTCAA AAACCTGTTA GAGTCCTAAG CATTCTCCTG	60
TTAGTATTGG GATTTTACCC CTGTCCTATA AAGATGTTAT GTACCAAAAA TGAAGTGGAG	120
GGCCATACCC TGAGGGAGGG GAGGGATCTC TAGTGTGTC AGAAGCGGAA GCTCA	175

(2) INFORMATION FOR SEQ ID NO:57:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 223 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:57:

AGCCATTAC CACCCATGGA TGAATGGATT TTGTAATTCT AGCTGTTGTA TTTTGTAAT	60
TTGTAAATTT TGTGTTTTT CTGTGAAACA CATACATTGG ATATGGGAGG TAAAGGAGTG	120
TCCCAGTTGC TCCTGGTCAC TCCCTTTATA GCCATTACTG TCTTGTTTCT TGTAACACAG	180
GTTAGGTTTT GGTCTCTCTT GCTCCACTGC AAAAAAAAAA AAA	223

(2) INFORMATION FOR SEQ ID NO:58:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 211 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:58:

GTTCGAAGGT GAACGTGTAG GTAGCGGATC TCACAACTGG GGAAGTGTCA AAGACGAATT	60
AACTGACTTG GATCAATCAA ATGTGACTGA GGAACACCT GAAGGTGAAG AACATCATCC	120
AGTGGCAGAC ACTGAAAATA AGGAGAATGA AGTTGAAGAG GTAAAAGAGG AGGGTCCAAA	180

AGAGATGACT TTGGATGGGT GGTAATGGC T 211

(2) INFORMATION FOR SEQ ID NO:59:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 208 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:59:

GCTCCTCTTG CCTTACCAAC TTTGCACCCA TCATCAACCA TGTGGCCAGG TTTGCAGCCC 60
AGGCTGCACA TCAGGGGACT GCCTCGCAAT ACTTCATGCT GTTGCTGCTG ACTGATGGTG 120
CTGTGACGGA TGTGGAAGCC ACACGTGAGG CTGTGGTGCG TGCCTCGAAC CTGCCCATGT 180
CAGTGATCAT TATGGGTGGT AAATGGCT 208

(2) INFORMATION FOR SEQ ID NO:60:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 171 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:60:

AGCCATTTAC CACCCATACT AAATTCTAGT TCAAACCTCA ACTTCTTCCA TAAACATCT 60
AACCACTGAC ACCAGTTGGC AATAGCTTCT TCCTTCTTTA ACCTCTTAGA GTATTTATGG 120

TCAATGCCAC ACATTCTGC AACTGAATAA AGTTGGTAAG GCAAGAGGAG C 171

(2) INFORMATION FOR SEQ ID NO:61:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 134 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:61:

CGGGTGATGC CTCCTCAGGC TTTGGTGTGT CCACTCNACT CACTGGCCTC TTCTCCAGCA 60
ACTGGTGAAN ATGTCCTCAN GAAAANCNCC ACACGCNGCT CAGGGTGGGG TGGGAANCAT 120
CANAATCATC NGGC 134

(2) INFORMATION FOR SEQ ID NO:62:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 145 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:62:

AGAGGGTACA TATGCAACAG TATATAAAGG AAGAAGTGCA CTGAGAGGAA CTTCATCAAG 60
GCCATTTAAT CAATAAGTGA TAGAGTCAAG GCTCAACCCA GGTGTGACGG ATTCCAGGTC 120
CCAAGCTCCT TACTGGTACC CTCTT 145

(2) INFORMATION FOR SEQ ID NO:63:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 297 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:63:

TGCACTGAGA GGAATTCAAA GGGTTTATGC CAAAGAACAA ACCAGTCCTC TGCAGCCTAA	60
CTCATTTGTT TTTGGGCTGC GAAGCCATGT AGAGGGCGAT CAGGCAGTAG ATGGTCCCTC	120
CCACAGTCAG CGCCATGGTG GTCCGGTAAA GCATTTGGTC AGGCAGGCCT CGTTTCAGGT	180
AGACGGGCAC ACATCAGCTT TCTGGAAAAA CTTTGTAGC TCTGGAGCTT TGTTTTTCCC	240
AGCATAATCA TACTGTGG AATCGGAGGT CAGTTTAGTT GGTAAGGCAA GAGGAGC	297

(2) INFORMATION FOR SEQ ID NO:64:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 300 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:64:

GCACTGAGAG GAACTTCCAA TACTATGTTG AATAGGAGTG GTGAGAGAGG GCATCCTTGT	60
CTTGTGCCGG TTTTCAAAGG GAATGCTTCC AGCTTTTGCC CATTAGTAT AATATTAAAG	120

AATGTTTTAC CATTTTCTGT CTGCGCTGTT TTTCTGTGTT TTTGTTGGTC TCTTCATTCT 180
CCATTTTTAG GCCTTTACAT GTTAGGAATA TATTCTTTT AATGATACTT CACCTTTGGT 240
ATCTTTTGTG AGACTCTACT CATAGTGTGA TAAGCACTGG GTTGGTAAGG CAAGAGGAGC 300

(2) INFORMATION FOR SEQ ID NO:65:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 203 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:65:

GCTCCTCTTG CCTTACCAAC TCACCCAGTA TGTCAGCAAT TTTATCRGCT TTACCTACGA 60
AACAGCCTGT ATCCAAACAC TTAACACACT CACCTGAAAA GTTCAGGCAA CAATCGCCTT 120
CTCATGGGTC TCTCTGCTCC AGTTCTGAAC CTTTCTCTTT TCCTAGAACA TGCATTTARG 180
TCGATAGAAG TTCCTCTCAG TGC 203

(2) INFORMATION FOR SEQ ID NO:66:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 344 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:66:

TACGGGGACC CCTGCATTGA GAAAGCGAGA CTCACTCTGA AGCTGAAATG CTGTTGCCCT	60
TGCAGTGCTG GTAGCAGGAG TTCTGTGCTT TGTGGGCTAA GGCTCCTGGA TGACCCCTGA	120
CATGGAGAAG GCAGAGTTGT GTGCCCTTC TCATGGCCTC GTCAAGGCAT CATGGACTGC	180
CACACACAAA ATGCCGTTTT TATTAACGAC ATGAAATTGA AGGAGAGAAC ACAATTCCT	240
GATGTGGCTC GTAACCATGG ATATGGTCAC ATACAGAGGT GTGATTATGT AAAGGTTAAT	300
TCCACCCACC TCATGTGGAA ACTAGCCTCA ATGCAGGGGT CCA	344

(2) INFORMATION FOR SEQ ID NO:67:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 157 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:67:

GCACTGAGAG GAACTTCGTA GGGAGGTTGA ACTGGCTGCT GAGGAGGGGG AACAAACAGGG	60
TAACCAGACT GATAGCCATT GGATGGATAA TATGGTGGTT GAGGAGGGAC ACTACTTATA	120
GCAGAGGGTT GTGTATAGCC TGAGGAGGCA TCACCCG	157

(2) INFORMATION FOR SEQ ID NO:68:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 137 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:68:

GCACTGAGAG GAACTTCTAG AAAGTGAAAG TCTAGACATA AAATAAAATA AAAATTTAAA 60

ACTCAGGAGA GACAGCCCAG CACGGTGGCT CACGCCTGTA ATCCCAGAAC TTTGGGAGCC 120

TGAGGAGGCA TCACCCG 137

(2) INFORMATION FOR SEQ ID NO:69:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 137 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:69:

CGGGTGATGC CTCCTCAGGC TGTATTTTGA AGACTATCGA CTGGACTTCT TATCAACTGA 60

AGAATCCGTT AAAAATACCA GTTGTATTAT TTCTACCTGT CAAAATCCAT TTCAAATGTT 120

GAAGTTCCTC TCAGTGC 137

(2) INFORMATION FOR SEQ ID NO:70:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 220 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:70:

AGCATGTTGA GCCCAGACAC GCAATCTGAA TGAGTGTGCA CCTCAAGTAA ATGTCTACAC	60
GCTGCCTGGT CTGACATGGC ACACCATCNC GTGGAGGGCA CASCTCTGCT CNGCCTACWA	120
CGAGGGCANT CTCATWGACA GGTTCACCC ACCAACTGC AAGAGGCTCA NNAAGTACTR	180
CCAGGGTMYA SGGACMASGG TGGGAYTYCA YCACWCATCT	220

(2) INFORMATION FOR SEQ ID NO:71:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 353 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:71:

CGTTAGGGTC TCTATCCACT GCTAAACCAT ACACCTGGGT AAACAGGGAC CATTTAACAT	60
TCCCANCTAA ATATGCCAAG TGA CTTCACA TGTTTATCTT AAAGATGTCC AAAACGCAAC	120
TGATTTTCTC CCCTAAACCT GTGATGGTGG GATGATTAAN CCTGAGTGGT CTACAGCAAG	180
TTAAGTGCAA GGTGCTAAAT GAANGTGACC TGAGATACAG CATCTACAAG GCAGTACCTC	240
TCAACNCAGG GCAACTTIGC TTCTCANAGG GCATTTAGCA GTGCTGAAG TAATTTCTGT	300
ATTACAACTC ACGGGGCGGG GGGTGAATAT CTANTGGANA GNAGACCCTA ACG	353

(2) INFORMATION FOR SEQ ID NO:72:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 343 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:72:

GCACTGAGAG GAACTTCCAA TACYATKATC AGAGTGAACA RGCARCCYAC AGAACAGGAG	60
AAAATGTTYG CAATCTCTCC ATCTGACAAA AGGCTAATAT CCAGAWTCTA AWAGGAACTT	120
AAACAAATTT ATGAGAAAAG AACARACAAC CTCAWCAAAA AGTGGGTGAA GGAWATGCTS	180
AAARGAAGAC ATYTATTCAG CCAGTAAACA YATGAAAAAA AGGCTCATSA TCACTGAWCA	240
TTAGAGAAAT GCAAATCAAA ACCACAATGA GATACCATCT YAYRCCAGTT AGAAYGGTGA	300
TCATTAAAR STCAGGAAAC AACAGATGCT GGACAAGGTG TCA	343

(2) INFORMATION FOR SEQ ID NO:73:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 321 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:73:

GCACTGAGAG GAACTTCAGA GAGAGAGAGA GAGTCCACC CTGTACTTGG GGAGAGAAAC	60
AGAAGGTGAG AAAGTCTTTG GTTCTGAAGC AGCTTCTAAG ATCTTTTCAT TTGCTTCATT	120

TCAAAGTTCC CATGCTGCCA AAGTGCCATC CTTTGGGGTA CTGTTTCTG AGCTCCAGTG 180
ATAACTCATT TATACAAGGG AGATACCCAG AAAAAAGTG AGCAAATCTT AAAAAGGTGG 240
CTTGAGTTCA GCCTTAAATA CCATCTTGAA ATGACACAGA GAAAGAANGA TGTGGGTGG 300
GAGTGGATAG AGACCCTAAC G 321

(2) INFORMATION FOR SEQ ID NO:74:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 321 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:74:

GCACTGAGAG GAACTTCAGA GAGAGAGAGA GAGTCCACC CTGTACTTGG GGAGAGAAAC 60
AGAAGGTGAG AAAGTCTTG GTTCTGAAGC AGCTTCTAAG ATCTTTTCAT TTGCTTCATT 120
TCAAAGTTCC CATGCTGCCA AAGTGCCATC CTTTGGGGTA CTGTTTCTG AGCTCCAGTG 180
ATAACTCATT TATACAAGGG AGATACCCAG AAAAAAGTG AGCAAATCTT AAAAAGGTGG 240
CTTGAGTTCA GYCTTAAATA CCATCTTGAA ATGAMACAGA GAAAGAAGGA TGTGGGTGG 300
GAGTGGATAG AGACCCTAAC G 321

(2) INFORMATION FOR SEQ ID NO:75:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 317 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:75:

GCACTGAGAG GAACTTCCAC ATGCACTGAG AAATGCATGT TCACAAGGAC TGAAGTCTGG	60
AACTCAGTTT CTCAGTTCCA ATCCTGATTC AGGTGTTTAC CAGCTACACA ACCTTAAGCA	120
AGTCAGATAA CCTTAGCTTC CTCATATGCA AAATGAGAAT GAAAAGTACT CATCGCTGAA	180
TTGTTTTGAG GATTAGAAAA ACATCTGGCA TGCAGTAGAA ATTCAATTAG TATTCATTTT	240
CATTCTTCTA AATTAAACAA ATAGGATTTT TAGTGGTGGA ACTTCAGACA CCAGAAATGG	300
GAGTGGATAG AGACCCT	317

(2) INFORMATION FOR SEQ ID NO:76:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 244 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:76:

CGTTAGGGTC TCTATCCACT CCCACTACTG ATCAAACCTCT ATTTATTTAA TTATTTTAT	60
CATACTTTAA GTTCTGGGAT ACACGTGCAG CATGCGCAGG TTTGTTGCAT AGGTATACAC	120
TTGCCATGGT GGTTCGCTGC ACCCATCAGT CCATCATCTA CATTAGGTAT TTCTCCTAAT	180

GCTATCCCTC CCCTAGCCCC TTACACCCCC AACAGGCTCT AGTGTGTGAA GTTCCTCTCA 240

GTGC 244

(2) INFORMATION FOR SEQ ID NO:77:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 254 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:77:

CGTTAGGGTC TCTATCCACT GAAATCTGAA GCACAGGAGG AAGAGAAGCA GTYCTAGTGA 60

GATGGCAAGT TCWTTTACCA CACTCTTTAA CATTTYGTTT AGTTTTAACC TTTATTTATG 120

GATAATAAAG GTTAATATTA ATAATGATT ATTTTAAGGC ATTCCCRAAT TTGCATAATT 180

CTCCTTTTGG AGATACCCCTT TTATCTCCAG TGCAAGTCTG GATCAAAGTG ATASAMAGAA 240

GTTCCTCTCA GTGC 254

(2) INFORMATION FOR SEQ ID NO:78:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 355 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:78:

TTCGATACAG GCAAACATGA ACTGCAGGAG GGTGGTGACG ATCATGATGT TGCCGATGGT 60
CCGGATGGNC ACGAAGACGC ACTGGANAC GTGCTTACGT CCTTTTGCTC TGTGATGGC 120
CCTGAGGGGA CGCAGGACCC TTATGACCCT CAGAATCTTC ACAACGGGAG ATGGCACTGG 180
ATTGANTCCC ANTGACACCA GAGACACCCC AACCACCAGN ATATCANTAT ATTGATGTAG 240
TTCCTGTAGA NGGCCCCCTT GTGGAGGAAA GCTCCATNAG TTGGTCATCT TCAACAGGAT 300
CTCAACAGTT TCCGATGGCT GTGATGGGCA TAGTCATANT TAACNTGTN TCGAA 355

(2) INFORMATION FOR SEQ ID NO:79:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 406 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:79:

TAAGAGGGTA CCAGCAGAAA GGTTAGTATC ATCAGATAGC ATCTTATACG AGTAATATGC 60
CTGCTATTTG AAGTGTAATT GAGAAGGAAA ATTTTAGCGT GCTCACTGAC CTGCCTGTAG 120
CCCCAGTGAC AGCTAGGATG TGCATTCTCC AGCCATCAAG AGACTGAGTC AAGTTGTTCC 180
TTAAGTCAGA ACAGCAGACT CAGCTCTGAC ATTCTGATTC GAATGACACT GTTCAGGAAT 240
CGGAATCCTG TCGATTAGAC TGGACAGCTT GTGGCAAGTG AATTGCTGCTG TAACAAGCCA 300
GATTTTTTAA AATTTATATT GTAAATAATG TGTGTGTGTG TGTGTGTATA TATATATATA 360
TGACAGTTA TCTAAGTTAA TTTAAAAGTT GTTTGGTACC CTCTTA 406

(2) INFORMATION FOR SEQ ID NO:80:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 327 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:80:

```
TTTTTTTTTT TTTACTCGGC TCAGTCTAAT CCTTTTGTG GTCAC TCATA GGCCAGACTT    60
AGGGCTAGGA TGATGATTAA TAAGAGGGAT GACATAACTA TTAGTGGCAG GTTAGTTGTT    120
TGTAGGGCTC ATGGTAGGGG TAAAAGGAGG GCAATTTCTA GATCAAATAA TAAGAAGGTA    180
ATAGCTACTA AGAAGAATTT TATGGAGAAA GGGACGCGGG CGGGGGATAT AGGGTCGAAG    240
CCGCACTCGT AAGGGGTGGA TTTTCTATG TAGCCGTTGA GTTGTGGTAG TCAAAATGTA    300
ATAATTATTA GTAGTAAGCC TAGGAGA                                         327
```

(2) INFORMATION FOR SEQ ID NO:81:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 318 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:81:

```
TAGTCTATGC GGTGATTTCG GCAATCCATT ATTTGCTGGA TTTTGT CATG TGTTTTGCCA    60
```

ATTGCATTCA TAATTTATTA TGCATTTATG CTGTATCTC CTAAGTCATG GTATATAATC 120
CATGCTTTTT ATGTTTTGTC TGACATAAAC TCTTATCAGA GCCCTTTGCA CACAGGGATT 180
CAATAAATAT TAACACAGTC TACATTTATT TGGTGAATAT TGCATATCTG CTGTACTGAA 240
AGCACATTAA GTAACAAAGG CAAGTGAGAA GAATGAAAAG CACTACTCAC AACAGTTATC 300
ATGATTGCGC ATAGACTA 318

(2) INFORMATION FOR SEQ ID NO:82:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 338 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:82:

TCTTCAACCT CTA TCTCCAC TAATAGCTTT TTGATGACTT CTAGCAAGCC TCGCTAACCT 60
CGCCTTACCC CCCACTATTA ACCTACTGGG AGAACTCTCT GTGCTAGTAA CCACGTTCTC 120
CTGATCAAAT ATCACTCTCC TACTTACAGG ACTCAACATA CTAGTCACAG CCCTATACTC 180
CCTCTACATA TTTACCACAA CACAATGGGG CTCACTCACC CACCACATTA ACAACATAAA 240
ACCCTCATTC ACACGAGAAA ACACCCTCAT GTTCATACAC CTATCCCCCA TTCTCCTCCT 300
ATCCCTCAAC CCCGACATCA TTACGGGGTT TTCCTCTT 338

(2) INFORMATION FOR SEQ ID NO:83:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 111 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:83:

```
AGCCATTTAC CACCCATCCA CAAAAAAAAA AAAAAAAAAAG AAAAATATCA AGGAATAAAA    60
ATAGACTTTG AACAAAAAGG AACATTGCT GGCCTGAGGA GGCATCACCC G              111
```

(2) INFORMATION FOR SEQ ID NO:84:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 224 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:84:

```
TCGGGTGATG CCTCCTCAGG CCAAGAAGAT AAAGCTTCAG ACCCCTAACA CATTTCCAAA    60
AAGGAAGAAA GGAGAAAAAA GGGCATCATC CCCGTTCCGA AGGGTCAGGG AGGAGGAAAT    120
TGAGGTGGAT TCACGAGTTG CGGACAATC CTTTGATGCC AAGCGAGGTG CAGCCGAGA      180
CTGGGGAGAG CGAGCCAATC AGGTTTTGAA GTTCCTCTCA GTGC                    224
```

(2) INFORMATION FOR SEQ ID NO:85:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 348 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:85:

GCACTGAGAG GAACTTCGTT GGAAACGGGT TTTTTCATG TAAGGCTAGA CAGAAGAATT	60
CTCAGTAACT TCCTTGTT GTGTGTATTC AACTCACASA GTTGAACGAT CCTTTACACA	120
GAGCAGACTT GTAACACTCT TWTGTGGAA TTTGCAAGTG GAGATTTTCTAG SCGCTTTGAA	180
GTSAAAGGTA GAAAAGGAAA TATCTTCCTA TAAAACTAG ACAGAATGAT TCTCAGAAAC	240
TCCTTTGTGA TGTGTGCGTT CAACTCACAG AGTTTAACCT TTCWTTTCAT AGAAGCAGTT	300
AGGAAACACT CTGTTTGTA AGTCTGCAAG TGGATAGAGA CCCTAACG	348

(2) INFORMATION FOR SEQ ID NO:86:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 293 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:86:

GCACTGAGAG GAACTTCYTT GTGWTGKTG YATTCAACTC ACAGAGTTGA ASSWTSMTT	60
ACABAGWKCA GGCTTKCAA CACTCTTTT GTMGAATYG CAAGWGGAKA TTTSRRCCRC	120
TTTGWGGYCW WYSKTMGA AW MGRWATATC TTCWYATMRA AMCTAGACAG AAKSATTCTC	180

AKAAWSTYYY YTGTGAWGWS TGCRTTCAAC TCACAGAGKT KAACMWTYCT KYTSATRGAG 240

CAGTTWKGA AACTCTMTTC TTTGGATTCT GCAAGTGGAT AGAGACCCTA ACG 293

(2) INFORMATION FOR SEQ ID NO:87:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:87:

CTCCTAGGCT 10

(2) INFORMATION FOR SEQ ID NO:88:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:88:

AGTAGTTGCC 10

(2) INFORMATION FOR SEQ ID NO:89:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:89:

TTCCGTTATG C

11

(2) INFORMATION FOR SEQ ID NO:90:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:90:

TGGTAAAGGG

10

(2) INFORMATION FOR SEQ ID NO:91:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:91:

TCGGTCATAG

10

(2) INFORMATION FOR SEQ ID NO:92:

(i) SEQUENCE CHARACTERISTICS:

100

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:92:

TACAACGAGG

10

(2) INFORMATION FOR SEQ ID NO:93:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:93:

TGGATTGGTC

10

(2) INFORMATION FOR SEQ ID NO:94:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:94:

CTTCTACCC

10

(2) INFORMATION FOR SEQ ID NO:95:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:95:

TTTTGGCTCC

10

(2) INFORMATION FOR SEQ ID NO:96:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:96:

GGAACCAATC

10

(2) INFORMATION FOR SEQ ID NO:97:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:97:

TCGATACAGG

10

(2) INFORMATION FOR SEQ ID NO:98:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:98:

GGTACTAAGG

10

(2) INFORMATION FOR SEQ ID NO:99:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:99:

AGTCTATGCG

10

(2) INFORMATION FOR SEQ ID NO:100:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:100:

CTATCCATGG

10

(2) INFORMATION FOR SEQ ID NO:101:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:101:

TCTGTCCACA

10

(2) INFORMATION FOR SEQ ID NO:102:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:102:

AAGAGGGTAC

10

(2) INFORMATION FOR SEQ ID NO:103:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs

104

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:103:

CTTCAACCTC

10

(2) INFORMATION FOR SEQ ID NO:104:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 20 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:104:

GCTCCTCTTG CCTTACCAAC

20

(2) INFORMATION FOR SEQ ID NO:105:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 20 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:105:

GTAAGTCGAG CAGTGTGATG

20

(2) INFORMATION FOR SEQ ID NO:106:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:106:

GTAAGTCGAG CAGTCTGATG

20

(2) INFORMATION FOR SEQ ID NO:107:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:107:

GACTTAGTGG AAAGAATGTA

20

(2) INFORMATION FOR SEQ ID NO:108:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:108:

GTAATTCGC CAACCGTAGT

20

(2) INFORMATION FOR SEQ ID NO:109:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:109:

ATGGTTGATC GATAGTGGA

20

(2) INFORMATION FOR SEQ ID NO:110:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:110:

ACGGGGACCC CTGCATTGAG

20

(2) INFORMATION FOR SEQ ID NO:111:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:111:

TATTCTAGAC CATTGCTAC

20

(2) INFORMATION FOR SEQ ID NO:112:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:112:

ACATAACCAC TTTAGCGTTC

20

(2) INFORMATION FOR SEQ ID NO:113:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:113:

CGGGTGATGC CTCCTCAGGC

20

(2) INFORMATION FOR SEQ ID NO:114:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid

108

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:114:

AGCATGTTGA GCCCAGACAC

20

(2) INFORMATION FOR SEQ ID NO:115:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:115:

GACACCTTGT CCAGCATCTG

20

(2) INFORMATION FOR SEQ ID NO:116:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:116:

TACGCTGCAA CACTGTGGAG

20

(2) INFORMATION FOR SEQ ID NO:117:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:117:

CGTTAGGGTC TCTATCCACT

20

(2) INFORMATION FOR SEQ ID NO:118:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:118:

AGACTGACTC ATGTCCCCTA

20

(2) INFORMATION FOR SEQ ID NO:119:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:119:

TCATCGCTCG GTGACTCAAG

20

(2) INFORMATION FOR SEQ ID NO:120:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:120:

CAAGATTCCA TAGGCTGACC

20

(2) INFORMATION FOR SEQ ID NO:121:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:121:

ACGTACTGGT CTTGAAGGTC

20

(2) INFORMATION FOR SEQ ID NO:122:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:122:

GACGCTTGGC CACTTGACAC

20

(2) INFORMATION FOR SEQ ID NO:123:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:123:

GTATCGACGT AGTGGTCTCC

20

(2) INFORMATION FOR SEQ ID NO:124:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:124:

TAGTGACATT ACGACGCTGG

20

(2) INFORMATION FOR SEQ ID NO:125:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:125:

CGGGTGATGC CTCCTCAGGC

20

(2) INFORMATION FOR SEQ ID NO:126:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:126:

ATGGCTATTT TCGGGGGCTG ACA

23

(2) INFORMATION FOR SEQ ID NO:127:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 22 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:127:

CCGGTATCTC CTCGTGGGTA TT

22

(2) INFORMATION FOR SEQ ID NO:128:

(i) SEQUENCE CHARACTERISTICS:

113

- (A) LENGTH: 18 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:128:

CTGCCTGAGC CACAAATG

18

(2) INFORMATION FOR SEQ ID NO:129:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 24 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:129:

CCGGAGGAGG AAGCTAGAGG AATA

24

(2) INFORMATION FOR SEQ ID NO:130:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 14 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:130:

TTTTTTTTTT TTAG

14

(2) INFORMATION FOR SEQ ID NO:131:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 18 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:131:

Ser Ser Gly Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val
1 5 10 15

Gly Ile

(2) INFORMATION FOR SEQ ID NO:132:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:132:

Gln Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Xaa Ile Glu Val
1 5 10 15

Val Gln Gly His Asp Glu
20

(2) INFORMATION FOR SEQ ID NO:133:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:133:

Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu Ala Tyr Arg Ile Tyr
1 5 10 15

Thr Pro Phe Asp Leu Ser Ala
20

(2) INFORMATION FOR SEQ ID NO:134:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:134:

Tyr Leu Leu Val Gly Ile Gln Gly Ala
1 5

(2) INFORMATION FOR SEQ ID NO:135:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:135:

Gly Ala Ala Gln Lys Pro Ile Asn Leu
1 5

(2) INFORMATION FOR SEQ ID NO:136:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:136:

Asn Leu Ser Lys Xaa Ile Glu Val Val
1 5

(2) INFORMATION FOR SEQ ID NO:137:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:137:

Glu Val Val Gln Gly His Asp Glu Ser
1 5

(2) INFORMATION FOR SEQ ID NO:138:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:138:

His Leu Gln Glu Ala Tyr Arg Ile Tyr
1 5

(2) INFORMATION FOR SEQ ID NO:139:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:139:

Asn Leu Ala Phe Val Ala Gln Ala Ala
1 5

(2) INFORMATION FOR SEQ ID NO:140:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:140:

Phe Val Ala Gln Ala Ala Pro Asp Ser
1 5

(2) INFORMATION FOR SEQ ID NO:141:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 9388 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:141:

GCTCGCGGCC GCGAGCTCAA TTAACCTCA CTAAAGGAG TCGACTCGAT CAGACTGTTA	60
CTGTGTCTAT GTAGAAAGAA GTAGACATAA GAGATTCCAT TTTGTTCTGT ACTAAGAAAA	120
ATTCTTCTGC CTTGAGATGC TGTTAATCTG TAACCCTAGC CCCAACCTG TGCTCACAGA	180
GACATGTGCT GTGTTGACTC AAGGTTCAAT GGATTAGGG CTATGCTTTG TTAAAAAAGT	240
GCTTGAAGAT AATATGCTTG TTAAAAGTCA TCACCATTCT CTAATCTCAA GTACCCAGGG	300
ACACAATACA CTGCGGAAGG CCGCAGGGAC CTCTGTCTAG GAAAGCCAGG TATTGTCCAA	360
GATTTCCTCC CATGTGATAG CCTGAGATAT GGCTCATGG GAAGGGTAAG ACCTGACTGT	420
CCCCCAGCCC GACATCCCCC AGCCCAGCAT CCCCAGCCC GACACCCGAA AAGGGTCTGT	480
GCTGAGGAGG ATTAGTAAAA GAGGAAGGCC TCTTGCAGT TGAGGTAAGA GGAAGGCATC	540
TGTCTCCTGC TCGTCCCTGG GCAATAGAAT GTCTTGGTGT AAAACCCGAT TGTATGTTCT	600

ACTTACTGAG ATAGGAGAAA ACATCCTTAG GGCTGGAGGT GAGACACGCT GCGGCAATA 660

CTGCTCTTTA ATGCACCGAG ATGTTTGTAT AAGTGACAT CAAGGCACAG CACCTTTCCT 720

TAAACTTATT TATGACACAG AGACCTTGT TCACGTTTC CTGCTGACCC TCTCCCCACT 780

ATTACCCTAT TGGCCTGCCA CATCCCCCTC TCCGAGATGG TAGAGATAAT GATCAATAAA 840

TACTGAGGGA ACTCAGAGAC CAGTGTCCCT GTAGGTCCTC CGTGTGCTGA GCGCCGGTCC 900

CTTGGGCTCA CTTTCTTTC TCTATACTTT GTCTCTGTGT CTCTTTCTTT TCTCAGTCTC 960

TCGTTCCACC TGACGAGAAA TACCCACAGG TGTGGAGGGG CAGGCCACCC CTCAATAAT 1020

TTACTAGCCT GTTCGCTGAC AACAAGACTG GTGGTGCAGA AGGTTGGGTC TTGGTGTCA 1080

CCGGGTGGCA GGCATGGGCC AGGTGGGAGG GTCTCCAGCG CCTGGTGCAA ATCTCCAAGA 1140

AAGTGCAGGA AACAGCACCA AGGGTGATTG TAAATTTTGA TTTGGCGCGG CAGGTAGCCA 1200

TTCCAGCGCA AAAATGCGCA GGAAAGCTTT TGCTGTGCTT GTAGGCAGGT AGGCCCCAAG 1260

CACCTTCTAT TGGCTAATGT GGAGGGAACC TGCACATCCA TTGGCTGAAA TCTCCGTCTA 1320

TTTGAGGCTG ACTGAGCGCG TTCCTTTCTT CTGTGTTGCC TGGAAACGGA CTGTCTGCCT 1380

AGTAACATCT GATCACGTTT CCCATTGGCC GCCGTTTCGG GAAGCCCGCC CTCCCATTTC 1440

CGGAAGCCTG GCGCAAGGTT GGTCTGCAGG TGGCCTCCAG GTGCAAAGTG GGAAGTGTGA 1500

GTCCTCAGTC TTGGGCTATT CGGCCACGTG CCTGCCGAC ATGGGACGCT GGAGGGTCAG 1560

CAGCGTGGAG TCCTGGCCTT TTGCGTCCAC GGGTGGGAAA TTGGCCATTG CCACGGCGGG 1620

AACTGGGACT CAGGCTGCCC CCCGGCCGTT TCTCATCCGT CCACCGGACT CGTGGGCGCT 1680

CGCAC1GGCG CTGATGTAGT TTCCTGACCT CTGACCCGTA TTGTCTCCAG ATTAAAGGTA	1740
AAAACGGGGC TTTTTCAGCC CACTCGGGTA AAACGCCTTT TGATTCTAG GCAGGTGTTT	1800
TGTTGCACGC CTGGGAGGGA GTGACCCGCA GGTGAGGTT TATTAAAATA CATTCCTGGT	1860
TTATGTTATG TTTATAATAA AGCACCCCAA CCTTTACAAA ATCTCACTTT TTGCCAGTTG	1920
TATTATTTAG TGGACTGTCT CTGATAAGGA CAGCCAGTTA AAATGGAATT TTGTTGTTGC	1980
TAATTAAACC AATTTTTAGT TTTGGTGTTT GTCCTAATAG CAACAAC TTC CAGGCTTTA	2040
TAAACCATA TTTCTGGGG GAAATTTCTG TGAAGGCAC AGCGAGTTAG TTTGGAATTG	2100
TTTTAAAGGA AGTAAGTTCC TGGTTTTGAT ATCTTAGTAG TGTAATGCC AACCTGGTTT	2160
TTACTAACCC TGTTTTTAGA CTCTCCCTTT CCTTAAATCA CCTAGCCTTG TTTCCACCTG	2220
AATTGACTCT CCCTTAGCTA AGAGCGCCAG ATGGACTCCA TCTTGCTCT TCACTGGCA	2280
GCCCCCTCCT CAAGGACTTA ACTTGTGCAA GCTGACTCCC AGCACATCCA AGAATGCAAT	2340
TAAGTGTAA GATACTGTGG CAAGCTATAT CCGCAGTTCC GAGGAATTCA TCCGATTGAT	2400
TATGCCCAA AGCCCCGCGT CTATCACCTT GTAATAATCT TAAAGCCCT GCACCTGGAA	2460
CTATTAACCT TCCTGTAACC ATTTATCCTT TTAACTTTT TGCTTACTTT ATTTCTGTAA	2520
AATTGTTTTA ACTAGACCTC CCCTCCCTT TCTAAACCA AGTATAAAAG AAGATCTAGC	2580
CCCTTCTTCA GAGCGGAGAG AATTTTGAGC ATTAGCCATC TCTTGGCGGC CAGCTAAATA	2640
AATGGACTTT TAATTTGTCT CAAAGTGTGG CGTTTTCTCT AACTCGCTCA GGTACGACAT	2700
TTGGAGGCC CAGCGAGAAA CGTCACCGG AGAAACGTCA CCGGGCGAGA GCCGGGCCG	2760

CTGTGTGCTC CCCCGGAAGG ACAGCCAGCT TGTAGGGGG AGTGCCACCT GAAAAAAAAA	2820
TTTCCAGGTC CCCAAAGGGT GACCGTCTTC CGGAGGACAG CGGATCGACT ACCATGCGGG	2880
TGCCCACCAA AATTCCACCT CTGAGTCCTC AACTGCTGAC CCCGGGGTCA GGTAGGTCAG	2940
ATTTGACTTT GGTCTGGCA GAGGGAAGCG ACCCTGATGA GGGTGTCCCT CTTTGTACTC	3000
TGCCCATTTC TCTAGGATGC TAGAGGGTAG AGCCCTGGTT TTCTGTAGA CGCCTCTGTG	3060
TCTCTGTCTG GGAGGGAAGT GGCCCTGACA GGGGCCATCC CTTGAGTCAG TCCACATCCC	3120
AGGATGCTGG GGGACTGAGT CCTGGTTTCT GGCAGACTGG TCTCTCTCTC TCTCTTTTTC	3180
TATCTCTAAT CTTTCTTGT TCAGGTTTCT TGGAGAATCT CTGGGAAAGA AAAAAGAAAA	3240
ACTGTTATAA ACTCTGTGTG AATGGTGAAT GAATGGGGGA GGACAAGGGC TTGCGCTTGT	3300
CCTCCAGTTT GTAGCTCCAC GGCGAAAGCT ACGGAGTTCA AGTGGGCCCT CACCTGCGGT	3360
TCCGTGGCGA CCTCATAAGG CTTAAGGCAG CATCCGGCAT AGCTCGATCC GAGCCGGGGG	3420
TTTATACCGG CCTGTCAATG CTAAGAGGAG CCAAGTCCC CTAAGGGGGA GCGGCCAGGC	3480
GGGCATCTGA CTGATCCCAT CACGGGACCC CCTCCCCTTG TTTGTCTAAA AAAAAAAAAA	3540
GAAGAACTG TCATAACTGT TTACATGCCC TAGGGTCAAC TGTTTGTTTT ATGTTTATTG	3600
TTCTGTTCGG TGTCTATTGT CTTGTTTAGT GGTGTCAAG GTTTGCATG TCAGGACGTC	3660
GATATTGCCC AAGACGCTG GGTAAGAACT TCTGCAAGGT CCTAGTGCT GATTTTTTGT	3720
CACAGGAGGT TAAATTTCTC ATCAATCATT TAGGCTGGCC ACCACAGTCC TGTCTTTTCT	3780
GCCAGAAGCA AGTCAGGTGT TGTTACGGGA ATGAGTGTA AAAAAATTC GCCTGATTGG	3840

GATTCTGGC ACCATGATGG TTGTATTTAG ATTGTCATAC CCCACATCCA GGTTGATTGG	3900
ACCTCCTCTA AACTAACTG GTGGTGGGT CAAACAGCC ACCCTGCAGA TTCCTTGCT	3960
CACCTCTTTG GTCATTCTGT AACTTTTCCT GTGCCCTTAA ATAGCACACT GTGTAGGGAA	4020
ACCTACCCTC GTACTGCTTT ACTTCGTTTA GATTCTTACT CTGTTCTCT GTGGCTACTC	4080
TCCCATCTTA AAAACGATCC AAGTGGTCCT TTTCTCCTC CTGCCCCCT ACCCCACACA	4140
TCTCGTTTTC CAGTGCACA GCAAGTTCAG CGTCTCCAGG ACTTGGCTCT GCTCTCACTC	4200
CTTGAACCTT TAAAAGAAAA AGCTGGGTTT GAGCTATTTG CCTTTGAGTC ATGGAGACAC	4260
AAAAGGTATT TAGGGTACAG ATCTAGAAGA AGAGAGAGAA CACCTAGATC CAACTGACCC	4320
AGGAGATCTC GGGCTGGCCT CTAGTCCTCC TCCCTCAATC TTAAAGCTAC AGTGATGTGG	4380
CAAGTGGTAT TTAGCTGTTG TGGTTTTTCT GCTCTTCTG GTCATGTGA TTCTGTTCTT	4440
TCGATACTCC AGCCCCCAG GGAGTGAGTT TCTCTGTCTG TGCTGGGTTT GATATCTATG	4500
TTCAAATCTT ATTAAATTGC CTTCAAAAA AAAAAAAAAA GGGAAACACT TCCTCCAGC	4560
CTTGTAAGGG TTGGAGCCCT CTCCAGTATA TGCTGCAGAA TTTTCTCTC GGTTTCTCAG	4620
AGGATTATGG AGTCCGCCTT AAAAAAGCA AGCTCTGGAC ACTCTGCAA GTAGAATGGC	4680
CAAAGTTTGG AGTTGAGTGG CCCCTGAAG GGCTACTGAA CCTCACAATT GTTCAAGCTG	4740
TGTGGCGGGT TGTTACTGAA ACTCCCGGCC TCCCTGATCA GTTCCCTAC ATTGATCAAT	4800
GGCTGAGTTT GGTCAGGAGC ACCCCTTCCA TGCTCCACT CATGCACCAT TCATAATTTT	4860
ACCTCCAAGG TCCTCCTGAG CCAGACCGTG TTTTCGCCTC GACCCTCAGC CGGTTCAAGT	4920

CGCCCTGTAC TGCCTCTCTC TGAAGAAGAG GAGAGTCTCC CTCACCCAGT CCCACCGCCT 4980

TAAACCAGC CTAATCCCTT AGGGTCATCC CATGTCTCCT CGGCTATGTC CCCTGTAGGC 5040

TCATCACCCA TTGCCTCTTG GTTGCAACCG TGGTGGGAGG AAGTAGCCCC TCTACTACCA 5100

CTGAGAGAGG CACAAGTCCC TCTGGGTGAT GAGTGTCTCA CCCCTTCCT GGTTCATGTC 5160

CCTTCTTTCT ACTTCTGACT TGTATAATTG GAAAACCCAT AATCCTCCCT TCTCTGAAAA 5220

GCCCCAGGCT TTGACCTCAC TGATGGAGTC TGTACTCTGG ACACATTGGC CCACCTGGGA 5280

TGACTGTCAA CAGCTCCTTT TGACCCCTTT CACCTCTGAA GAGAGGGAAA GTATCCAAAG 5340

AGAGGCCAAA AAGTACAACC TCACATCAAC CAATAGGCCG GAGGAGGAAG CTAGAGGAAT 5400

AGTGATTAGA GACCCAATTG GGACCTAATT GGGACCCAAA TTTCTCAAGT GGAGGGAGAA 5460

CTTTTGACGA TTTCCACCGG TATCTCCTCG TGGGTATTCA GGGAGCTGCT CAGAAACCTA 5520

TAACTTGTG TAAGGCGACT GAAGTCGTCC AGGGGCATGA TGAGTCACCA GGAGTGTTC 5580

TAGAGCACCT CCAGGAGGCT TATCGGATTT ACACCCCTTT TGACCTGGCA GCCCCGAAA 5640

ATAGCCATGC TCTTAATTTG GCATTTGTGG CTCAGGCAGC CCCAGATAGT AAAAGGAAAC 5700

TCCAAAACT AGAGGGATTT TGCTGGAATG AATACCAGTC AGCTTTTAGA GATAGCCTAA 5760

AAGGTTTTTG ACAGTCAAGA GGTGAAAAA CAAAAACAAG CAGCTCAGGC AGCTGAAAAA 5820

AGCCACTGAT AAAGCATCCT GGAGTATCAG AGTTTACTGT TAGATCAGCC TCATTTGACT 5880

TCCCCTCCCA CATGGTGTTT AAATCCAGCT AACTACTTTC CTGACTCAA CTCCACTATT 5940

CCTGTTTATG ACTGTCAGGA ACTGTTGGAA ACTACTGAAA CTGGCCGACC TGATCTTCAA 6000

AATGTGCCCC TAGGAAAGGT GGATGCCACC GTGTTACAG ACAGTAGCAG CTCCTCGAG	6060
AAGGGACTAC GAAAGGCCGG TGCAGCTGTT ACCATGGAGA CAGATGTGTT GTGGGCTCAG	6120
GCTTTACCAG CAAACACCTC AGCACAAAAG GCTGAATTGA TCGCCCTCAC TCAGGCTCTC	6180
CGATGGGGTA AGGATATTAA CGTTAACT GACAGCAGGT ACGCCTTTC TACTGTGCAT	6240
GTACGTGGAG CCATCTACCA GGAGCGTGGG CTA CTACCT CAGCAGGTGG CTGTAATCCA	6300
CTGTAAAGGA CATCAAAAGG AAAACACGGC TGTTGCCCGT GGTAACCAGA AAGCTGATTC	6360
AGCAGCTCAA GATGCAGTGT GACTTTCAGT CACGCCTCTA AACTTGCTGC CCACAGTCTC	6420
CTTTCCACAG CCAGATCTGC CTGACAATCC CGCATACTCA ACAGAAGAAG AAAACTGGCC	6480
TCAGAACTCA GAGCCAATAA AAATCAGGAA GGTGGTGA TTCTTCCTGA CTCTAGAATC	6540
TTCATACCCC GAACTCTTGG GAAAACCTTA ATCAGTCACC TACAGTCTAC CACCCATTTA	6600
GGAGGAGCAA AGCTACCTCA GCTCCTCCGG AGCCGTTTTA AGATCCCCCA TCTCAAAGC	6660
CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC AGGTAAATGC CAAAAAGGT	6720
CCTAAACCCA GCCCAGGCCA CCGTCTCCA GAAAACCTAC CAGGAGAAAA GTGGGAAATT	6780
GACTTTACAG AAGTAAACC ACACCGGGCT GGTACAAAT ACCTTCTAGT ACTGGTAGAC	6840
ACCTTCTCTG GATGGACTGA AGCATTTGCT ACCAAAAACG AACTGTCAA TATGGTAGTT	6900
AAGTTTTTAC TCAATGAAAT CATCCCTCGA CGTGGGCTGC CTGTTGCCAT AGGGTCTGAT	6960
AATGGACCGG CCTTCGCCTT GTCTATAGTT TAGTCAGTCA GTAAGGCGTT AACATTCAA	7020
TGGAAGCTCC ATTGTGCTA TCGACCCAG AGCTCTGGG AAGTAGAACG CATGAACTGC	7080

ACCCTAAAA ACACCTTAC AAAATTAATC TTAGAAACCG GTGTAAATTG TGTAAGTCTC	7140
CTTCCTTTAG CCCTACTTAG AGTAAGGTGC ACCCCTTACT GGGCTGGGT CTTACCTTTT	7200
GAAATCATGT ATGGGAGGGC GCTGCCTATC TTGCCTAAGC TAAGAGATGC CCAATTGGCA	7260
AAAATATCAC AAATAATTT ATTACAGTAC CTACAGTCTC CCCAACAGGT ACAAGATATC	7320
ATCCTGCCAC TTGTTGAGG AACCCATCCC AATCCAATTC CTGAACAGAC AGGGCCCTGC	7380
CATTCAATCC CGCCAGGTGA CCTGTTGTTT GTTAAAAAGT TCCAGAGAGA AGGACTCCCT	7440
CCTGCTTGA AGAGACCTCA CACCGTCATC ACGATGCCAA CGGCTCTGAA GGTGGATGGC	7500
ATTCCTGCGT GGATTCATCA CTCCCGCATC AAAAAGGCCA ACGGAGCCCA ACTAGAAACA	7560
TGGGTCCCCA GGGCTGGGTC AGGCCCTTA AAAGTGCACC TAAGTTGGGT GAAGCCATTA	7620
GATTAATTCT TTTTCTTAAT TTTGTAAAAC AATGCATAGC TTCTGTCAA CTTATGTATC	7680
TTAAGACTCA ATATAACCCC CTTGTTATAA CTGAGGAATC AATGATTGA TTCCCCAAAA	7740
ACACAAGTGG GGAATGTAGT GTCCAACCTG GTTTTTACTA ACCCTGTTTT TAGACTCTCC	7800
CTTTCCTTTA ATCACTCAGC CTTGTTTCCA CCTGAATTGA CTCTCCCTTA GCTAAGAGCG	7860
CCAGATGGAC TCCATCTTGG CTCTTTCCT GGCAGCCGCT TCCTCAAGGA CTTAACTTGT	7920
GCAAGCTGAC TCCCAGCACA TCCAAGAATG CAATTAACCTG ATAAGATACT GTGGCAAGCT	7980
ATATCCGCAG TTCCCAGGAA TTCGTCCAAT TGATTACACC CAAAAGCCCC GCGTCTATCA	8040
CCTTGTAATA ATCTTAAAGC CCCTGCACCT GGAAGTATTA ACGTTCCTGT AACCATTAT	8100
CCTTTTAACT TTTTGCCTA CTTTATTCT GTAAAATTGT TTAACTAGA CCCCCCTCT	8160

CCTTTCTAAA CCAAAGTATA AAAGCAAATC TAGCCCCTTC TTCAGGCCGA GAGAATTTCTG	8220
AGCGTTAGCC GTCTCTTGGC CACCAGCTAA ATAAACGGAT TCTTCATGTG TCTCAAAGTG	8280
TGGCGTTTTTCT TCTAACTCGC TCAGGTACGA CCGTGGTAGT ATTTTCCCCA ACGTCTTATT	8340
TTTAGGGCAC GTATGTAGAG TAACTTTTAT GAAAGAAACC AGTTAAGGAG GTTTTGGGAT	8400
TTCCTTTATC AACTGTAATA CTGGTTTTGA TTATTTATTT ATTTATTTAT TTTTTTTGAG	8460
AAGGAGTTTC ACTCTTGTG CCCAGGCTGG AGTGCAATGG TGCGATCTTG GCTCACTGCA	8520
ACTTCCGCCT CCCAGGTTCA AGCGATTCTC CTGCCTCAGC CTCGAGAGTA GCTGGGATTA	8580
TAGGCATGCG CCACCACACC CAGCTAATTT TGTATTTTGA GTAAAGATGG GGTTTCTTCA	8640
TGTTGGTCAA GCTGGTCTGG AACTCCCCGC CTCGGGTGAT CTGCCCGCT CGGCCTCCGA	8700
AAGTGCTGGG ATTACAGGTG TGATCCACCA CACCCAGCCG ATTTATATGT ATATAAATCA	8760
CATTCCTCTA ACCAAAATGT AGTGTTTCCT TCCATCTTGA ATATAGGCTG TAGACCCCGT	8820
GGGTATGGGA CATTGTTAAC AGTGAGACCA CAGCAGTTTT TATGTCATCT GACAGCATCT	8880
CCAAATAGCC TTCATGGTTG TCACTGCTTC CCAAGACAAT TCCAAATAAC ACTTCCCAGT	8940
GATGACTTGC TACTTGCTAT TGTTACTTAA TGTGTTAAGG TGGCTGTTAC AGACACTATT	9000
AGTATGTCAG GAATTACACC AAAATTTAGT GGCTCAAACA ATCATTTTAT TATGTATGTG	9060
GATTCTCATG GTCAGGTCAG GATTTTCAGAC AGGGCACAAG GGTAGCCAC TTGTCTCTGT	9120
CTATGATGTC TGGCCTCAGC ACAGGAGACT CAACAGCTGG GGTCTGGGAC CATTTGGAGG	9180
CTGTTCCTT CACATCTGAT ACCTGGCTTG GGATGTTGGA AGAGGGGGTG AGCTGAGACT	9240

GAGTGCCTAT ATGTAGTGTT TCCATATGGC CTTGACTTCC TTACAGCCTG GCAGCCTCAG 9300
GGTAGTCAGA ATTCTTAGGA GGCACAGGGC TCCAGGGCAG ATGCTGAGGG GTCTTTTATG 9360
AGGTAGCACA GCAAATCCAC CCAGGATC 9388

(2) INFORMATION FOR SEQ ID NO:142:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 419 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:142:

TGTAAGTCGA GCAGTGTGAT GGAAGGAATG GTCTTTGGAG AGAGCATATC CATCTCCTCC 60
TCACTGCCTC CTAATGTCAT GAGGTACACT GAGCAGAATT AACAGGGTA GTCTTAACCA 120
CACTATTTTT AGCTACCTTG TCAAGCTAAT GGTAAAGAA CACTTTTGGT TTACACTTGT 180
TGGGTCATAG AAGTTGCTTT CCGCCATCAC GCAATAAGTT TGTGTGTAAT CAGAAGGAGT 240
TACCTTATGG TTTCAGTGTC ATTCTTTAGT TAACTTGGGA GCTGTGTAAT TTAGGCTTTG 300
CGTATTATTT CACTTCTGTT CTCCACTTAT GAAGTGATTG TGTGTTCCGG TGTGTGTGCG 360
TGCGCATGTG CTTCGGCAG TTAACATAAG CAAATACCCA ACATCACACT GCTCGACTT 419

(2) INFORMATION FOR SEQ ID NO:143:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 402 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:143:

TGTAAGTCGA GCAGTGTGAT GTCCACTGCA GTGTGTTGCT GGGAACAGTT AATGAGCAAA	60
TTGTATACAA TGGCTAGTAC ATTGACCGGG ATTTGTTGAA GCTGGTGAGT GTTATGACTT	120
AGCCTGTTAG ACTAGTCTAT GCACATGGCT CTGGTCAACT ACCGCTCTCT CATTTCTCCA	180
GATAAATCCC CCATGCTTTA TATTCTCTTC CAAACATACT ATCCTCATCA CCACATAGTT	240
CCTTTGTTAA TGCTTTGTTC TAGACTTTCC CTTTCTGTT TTCTTATTCA AACCTATATC	300
TCTTGCATA GATTGTAAAT TCAAATGCCC TCAGGGTGCA GGCAGTTCAT GTAAGGGAGG	360
GAGGCTAGCC AGTGAGATCT GCATCACACT GCTCGACTTA CA	402

(2) INFORMATION FOR SEQ ID NO:144:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 224 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:144:

TCGGGTGATG CCTCCTCAGG CCAAGAAGAT AAAGCTCAG ACCCCTAACA CATTTCCAAA	60
AAGGAAGAAA GGAGAAAAAA GGGCATCATC CCCGTTCCGA AGGGTCAGGG AGGAGGAAAT	120
IGAGGTGGAT TCACGAGTTG CGGACAAC TC TTGATGCC AAGCGAGGTG CAGCCGGAGA	180

CTGGGGAGAG CGAGCCAATC AGGTTTGTAA GTTCCTCTCA GTGC

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(2) INFORMATION FOR SEQ ID NO:145:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 111 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:145:

AGCCATTTAC CACCCATCCA CAAAAAAAAA AAAAAAAAAAG AAAAATATCA AGGAATAAAA 60

ATAGACTTTG AACAAAAAGG AACATTTGCT GGCCTGAGGA GGCATCACCC G 111

(2) INFORMATION FOR SEQ ID NO:146:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 585 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:146:

TAGCATGTTG AGCCCAGACA CTTGTAGAGA GAGGAGGACA GTTAGAAGAA GAAGAAAAGT 60

TTTTAAATGC TGAAAGTTAC TATAAGAAAG CTTTGGCTTT GGATGAGACT TTAAAGATG 120

CAGAGGATGC TTTGCAGAAA CTTCATAAAT ATATGCAGGT GATTCCTTAT TTCCTCCTAG 180

AAATTTAGTG ATATTTGAAA TAATGCCCAA ACTTAATTTT CTCCTGAGGA AACTATTCT 240

ACATTACTTA AGTAAGGCAT TATGAAAAGT TTCTTTT TAG GTATAGTTT TCCTAATTGG 300
GTTTGACATT GCTTCATAGT GCCTCTGTTT TTGTCCATAA TCGAAAGTAA AGATAGCTGT 360
GAGAAACTA TTACCTAAAT TTGGTATGTT GTTTGTAGAA ATGTCCTTAT AGGGAGCTCA 420
CCTGGTGGTT TTAAATTAT TGTTGCTACT ATAATTGAGC TAATTATAAA AACCTTTTGT 480
AGACATATTT TAAATTGTCT TTTCTGTAA TACTGATGAT GATGTTTTCT CATGCATTTT 540
CTTCTGAATT GGGACCATTG CTGCTGTGTC TGGGCTCACA TGCTA 585

(2) INFORMATION FOR SEQ ID NO:147:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 579 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:147:

TAGCATGTTG AGCCCAGACA CTGGGCAGCG GGGGTGGCCA CGGCAGCTCC TGCCGAGCCC 60
AAGCGTGTTT GTCTGTGAAG GACCCTGACG TCACCTGCCA GGCTAGGGAG GGGTCAATGT 120
GGAGTGAATG TTCACCGACT TTCGCAGGAG TGTGCAGAAG CCAGGTGCAA CTTGGTTTGC 180
TTGTGTTTAT CACCCCTCAA GATATGCACA CTGCTTTCCA AATAAAGCAT CAACTGTCAT 240
CTCCAGATGG GGAAGACTTT TTCTCCAACC AGCAGGCAGG TCCCATCCA CTCAGACACC 300
AGCACGTCCA CCTTCTCGGG CAGCACACG TCCTCCACCT TCTGCTGGTA CACGGTGATG 360

ATGTCAGCAA AGCCGTTCTG CANGACCAGC TGCCCCGTGT GCTGTGCCAT CTCACTGGCC 420
TCCACCGCGT ACACCGCTCT AGGCCGCGCA TANTGTGCAC AGAANAATG ATGATCCAGT 480
CCCACAGCCC ACGTCCAAGA NGACTTTATC CGTCAGGGAT TCTTTATTCT GCAGGATGAC 540
CTGTGGTATT AATTGTTTCGT GTCTGGGCTC AACATGCTA 579

(2) INFORMATION FOR SEQ ID NO:148:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 249 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:148:

TGACACCTTG TCCAGCATCT GCAAGCCAGG AAGAGAGTCC TCACCAAGAT CCCACCCCG 60
TTGGCACCAG GATCTTGGAC TTCCAATCTC CAGAACTGTG AGAAATAAGT ATTTGTCGCT 120
AAATAAATCT TTGTGGTTTC AGATATTTAG CTATAGCAGA TCAGGCTGAC TAAGAGAAAC 180
CCCATAAGAG TTACATACTC ATTAATCTCC GTCTCTATCC CCAGGTCTCA GATGCTGGAC 240
AAGGTGTCA 249

(2) INFORMATION FOR SEQ ID NO:149:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 255 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:149:

TGACACCTTG TCCAGCATCT GCTATTTTGT GACTTTTAA TAATAGCCAT TCTGACTGGT	60
GTGAGATGGT AACTCATTGT GGGTTTGGTC TGCAITTC TC TAATGATCAG TGATATTAAG	120
CTTTTTTAA ATATGCTTGT TGACCACATG TATATCATCT TTTGAGAAGT GTCTGTTTAT	180
ATCCTTTGCC CACTTTTTAA TTTTTTATC TTGTAAATTT GTTTAATTC CTTACAGATG	240
CTGGACAAGG TGTC	255

(2) INFORMATION FOR SEQ ID NO:150:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 318 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:150:

TTACGCTGCA AACTGTGGA GGCCAAGCTG GGATCACTTC TTCATTCTAA CTGGAGAGGA	60
GGGAAGTTCA AGTCCAGCAG AGGGTGGGTG GGTAGACAGT GGCACACAGA AATGTCAGCT	120
GGACCCCTGT CCCCGCATAG GCAGGACAGC AAGGCTGTGG CTCTCCAGGG CCAGCTGAAG	180
AACAGGACAC TGTCTCCGCT GCCACAAAGC GTCAGAGACT CCCATCTTTG AAGCACGGCC	240
TTCTTGGTCT TCCTGCACTT CCCTGTTCTG TTAGAGACCT GGTATAGAC AAGGCTTCTC	300
CACAGTGTG CAGCGTAA	318

(2) INFORMATION FOR SEQ ID NO:151:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 323 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:151:

TNACGCNGCN ACNNTGTAGA GANGGNAAGG CNTTCCCCAC ATTNCCCCTT CATNANAGAA	60
TTATTCNACC AAGNNTGACC NATGCCNTTT ATGACTTACA TGCNNACTNC NTAATCTGTN	120
TCNNGCCTTA AAAGCNNTC CACTACATGC NTCANCACTG TNTGTGTNAC NTCATNAACT	180
GTCNGNAATA GGGGCNCATA ACTACAGAAA TGCANTTCAT ACTGCTTCCA NTGCCATCNG	240
CGTGTGGCCT TNCCTACTCT TCTTNTATTC CAAGTAGCAT CTCTGGANTG CTTCCCCACT	300
CTCCACATTG TTGCAGCNAT AAT	323

(2) INFORMATION FOR SEQ ID NO:152:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 311 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:152:

TCAAGATTCC ATAGGCTGAC CAGTCCAAGG AGAGTTGAAA TCATGAAGGA GAGTCTATCT	60
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GGAGAGAGCT GTAGTTTGA GGGTTGCAAA GACTTAGGAT GGAGTTGGTG GGTGTGGTTA 120
GTCTCTAAGG TTGATTTTGT TCATAAATTT CATGCCCTGA ATGCCTTGCT TGCCTCACCC 180
TGGTCCAAGC CTTAGTGAAC ACCTAAAAGT CTCTGTCTTC TTGCTCTCCA AACTTCTCCT 240
GAGGATTTCC TCAGATTGTC TACATTCAGA TCGAAGCCAG TTGGCAAAACA AGATGCAGTC 300
CAGAGGGTCA G 311

(2) INFORMATION FOR SEQ ID NO:153:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 332 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:153:

CAAGATTCCA TAGGCTGACC AGGAGGCTAT TCAAGATCTC TGGCAGTTGA GGAAGTCTCT 60
TTAAGAAAAT AGTTTAAACA ATTTGTAAA ATTTTCTGT CTTACTTCAT TTCTGTAGCA 120
GTTGATATCT GGCTGTCCTT TTTATAATGC AGAGTGGGAA CTTCCCTAC CATGTTTGAT 180
AAATGTTGTC CAGGCTCCAT TGCCAATAAT GTGTTGTCCA AAATGCCTGT TTAGTTTTTA 240
AAGACGGAAC TCCACCCCTT GCTTGGTCTT AAGTATGTAT GGAATGTTAT GATAGGACAT 300
AGTAGTAGCG GTGGTCAGCC TATGGAATCT TG 332

(2) INFORMATION FOR SEQ ID NO:154:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:154:

TCAAGATTCC ATAGGCTGAC CTGGACAGAG ATCTCCTGGG TCTGGCCCAG GACAGCAGGC	60
TCAAGCTCAG TGGAGAAGGT TTCCATGACC CTCAGATTCC CCCAAACCTT GGATTGGGTG	120
ACATTGCATC TCCTCAGAGA GGGAGGAGAT GTANGTCTGG GCTTCCACAG GGACCTGGTA	180
TTTtaggATC AGGGTACCGC TGGCCTGAGG CTTGGATCAT TCANAGCCTG GGGGTGGAAT	240
GGCTGGCAGC CTGTGGCCCC ATTGAAATAG GCTCTGGGGC ACTCCCTCTG TTCCTANTTG	300
AACTTGGGTA AGGAACAGGA ATGTGGTCAN CCTATGGAAT CTTGA	345

(2) INFORMATION FOR SEQ ID NO:155:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 295 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:155:

GACGCTTGGC CACTTGACAC ATTAACAGT TTTGCATAAT CACTANCATG TATTCTAGT	60
TTGCTGTCTG CTGTGATGCC CTGCCCTGAT TCTCTGGCGT TAATGATGGC AAGCATAATC	120

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AAACGCTGTT CTGTTAATTC CAAGTTATAA CTGGCATTGA TTAAAGCATT ATCTTTCACA	180
ACTAAACTGT TCTTCATANA ACAGCCCATA TTATTATCAA ATTAAGAGAC AATGTATTCC	240
AATATCCTTT ANGGCCAATA TATTTNATGT CCCTTAATTA AGAGCTACTG TCCGT	295

(2) INFORMATION FOR SEQ ID NO:156:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 406 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:156:

GACGCTTGGC CACTTGACAC TGCAGTGGGA AAACCAGCAT GAGCCGCTGC CCCCAAGGAA	60
CCTCGAAGCC CAGGCAGAGG ACCAGCCATC CCAGCCTGCA GGTAAGTGT GTCACCTGTC	120
AGGTGGGCTT GGGGTGAGTG GGTGGGGGAA GTGTGTGTGC AAAGGGGGTG TNAATGTNTA	180
TGCGTGTGAG CATGAGTGAT GGCTAGTGTG ACTGCATGTC AGGGAGTGTG AACAAGCGTG	240
CGGGGGTGTG TGTGCAAGTG CGTATGCATA TGAGAATATG TGTCTGTGGA TGAGTGCATT	300
TGAAAGTCTG TGTGTGTGCG TGTGGTCATG ANGGTAANTT ANTGACTGCG CAGGATGTGT	360
GAGTGTGCAT GGAACACTCA NTGTGTGTGT CAAGTGGCCN ANCGTC	406

(2) INFORMATION FOR SEQ ID NO:157:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 208 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:157:

TGACGCTTGG CCACTTGACA CACTAAAGGG TGTTACTCAT CACTTTCTTC TCTCCTCGGT	60
GGCATGTGAG TGCATCTATT CACTTGGCAC TCATTGTTT GGCAGTGACT GTAANCCANA	120
TCTGATGCAT ACACCAGCTT GTAAATTGAA TAAATGTCTC TAATACTATG TGCTACAAT	180
ANGGTANGGG TGAGGAGAAG GGGAGAGA	208

(2) INFORMATION FOR SEQ ID NO:158:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 547 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:158:

CTTCAACCTC CTTCAACCTC CTTCAACCTC CTGGATTCAA ACAATCATCC CACCTCAGAC	60
TCCTTAGTAG CTGAGACTAC AGACTCACGC CACTACATCT GGCTAAATTT TTGTAGAGAT	120
AGGGTTTCAT CATGTTGCCC TGGCTGGTCT CAAACTCCTG ACCTCAAGCA ATGTGCCAC	180
CTCAGCCTCC CAAAGTGCTG GGATTACAGG CATAAGCCAC CATGCCAGT CCATNTTTAA	240
TCTTCCTAC CACATTCTTA CCACACTTTC TTTTATGTTT AGATACATAA ATGCTTACCA	300
TTATGATACA ATTGCCCACA GTATTAAGAC AGTAACATGC TGCACAGGT TGTAGCCTAG	360

GAACAGTAGG CAATACCACA TAGCTTAGGT GTGTGGTAGA CTATACCATC TAGGTTTGTG 420
TAAGTTACAC TTTATGCTGT TTACACAATG ACAAACCAT CTAATGATGC ATTTCTCAGA 480
ATGTATCCTT GTCAGTAAGC TATGATGTAC AGGGAACACT GCCCAAGGAC ACAGATATTG 540
TACCTGT 547

(2) INFORMATION FOR SEQ ID NO:159:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 203 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:159:

GCTCCTCTTG CCTTACCAAC TCACCCAGTA TGTCAGCAAT TTTATCRGCT TTACCTACGA 60
AACAGCCTGT ATCCAAACAC TTAACACACT CACCTGAAAA GTTCAGGCAA CAATCGCCTT 120
CTCATGGGTC TCTCTGCTCC AGTTCTGAAC CTTTCTCTTT TCCTAGAACA TGCATTTARG 180
TCGATAGAAG TTCCTCTCAG TGC 203

(2) INFORMATION FOR SEQ ID NO:160:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 402 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:160:

TGTAAGTCGA GCAGTGTGAT GGGTGAACA GGGTTGTAAG CAGTAATTGC AACTGTATT	60
TAAACAATAA TAATAATATT TAGCATTTAT AGAGCACTTT ATATCTTCAA AGTACTTGCA	120
AACATTAYCT AATTAAATAC CCTCTCTGAT TATAATCTGG ATACAAATGC ACTTAAACTC	180
AGGACAGGGT CATGAGARAA GTATGCATTT GAAAGTTGGT GCTAGCTATG CTTTAAAAAC	240
CTATACAATG ATGGGRAAGT TAGAGTTCAG ATTCTGTTGG ACTGTTTTTG TGCATTTTCA	300
TTCAGCCTGA TGGCAGAATT AGATCATATC TGCACTCGAT GACTYTGCTT GATAACTTAT	360
CACTGAAATC TGAGTGTGTA TCATCACACT GCTCGACTTA CA	402

(2) INFORMATION FOR SEQ ID NO:161:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 193 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:161:

AGCATGTTGA GCCCAGACAC TGACCAGGAG AAAAACCAAC CAATAGAAAC ACGCCAGAC	60
ACTGACCAGG AGAAAAACCA ACCAATAAAA ACAGGCCCGG ACATAAGACA AATAATAAAA	120
TTAGCGGACA AGGACATGAA AACAGCTATT GTAAGAGCGG ATATAGTGGT GTGTGTCTGG	180
GCTCAACATG CTA	193

(2) INFORMATION FOR SEQ ID NO:162:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 147 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:162:

TGTTGAGCCC AGACACTGAC CAGGAGAAAA ACCAACCAAT AAAACAGGC CCGGACATAA	60
GACAAATAAT AAAATTAGCG GACAAGGACA TGAAACAGC TATTGTAAGA GCGGATATAG	120
TGGTGTGTGT CTGGGCTCAA CATGCTA	147

(2) INFORMATION FOR SEQ ID NO:163:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 294 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:163:

TAGCATGTTG AGCCCAGACA CAAATCTTTC CTTAAGCAAT AAATCATTTC TGCATATGTT	60
TTTAAACCA CAGCTAAGCC ATGATTATTC AAAAGGACTA TTGTATTGGG TATTTTGATT	120
TGGGTCTTA TCTCCCTCAC ATTATCTTCA TTTCTATCAT TGACCTCTTA TCCCAGAGAC	180
TCTCAAACTT TTATGTTATA CAAATCACAT TCTGTCTCAA AAAATATCTC ACCCACTTCT	240

CTTCTGTTTC TGC GTGTGTA TGTGTGTGTG TGTGTGTCTG GGCTCAACAT GCTA 294

(2) INFORMATION FOR SEQ ID NO:164:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 412 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:164:

CGGGATTGGC TTGAGCTGC AGATGCTGCC TGTGACCGCA CCCGGCGTGG AACAGAAAGC 60
CACCTGGCTG CAAGTGC GCC AGAGCCGCC TGACTACGTG CTGCTGTGGG GCTGGGGCGT 120
GATGAACTCC ACCGCCCTGA AGGAAGCCCA GGCCACCGGA TACCCCCGCG ACAAGATGTA 180
CGGCGTGTGG TGGGCCGGTG CGGAGCCCGA TGTGCGTGAC GTGGGCGAAG GCGCCAAGGG 240
CTACAACGCG CTGGCTCTGA ACGGCTACGG CACGCAGTCC AAGGTGATCC ANGACATCCT 300
GAAACACGTG CACGACAAGG GCCAGGGCAC GGGGCCCAAA GACGAAGTGG GCTCGGTGCT 360
GTACACCCGC GGC GTGATCA TCCAGATGCT GGACAAGGTG TCAATCACTA AT 412

(2) INFORMATION FOR SEQ ID NO:165:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 361 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:165:

TTGACACCTT GTCCAGCATC TGCATCTGAT GAGAGCCTCA GATGGCTACC ACTAATGGCA	60
GAAGGCAAAG GAGAACAGGC ATTGTATGGC AAGAAAGGAA GAAAGAGAGA GGGGAGAAAG	120
GTGCTAGGTT CTTTCAACA ACCAGTTCTT GATGGAACTG AGAGTAAGAG CTCAAGGCCA	180
GGTGTGGTGA CTCCAACCAG TAATCCCAAC ATTTTAGGAG GCTGAGGCAG GCAGATGTCT	240
TGACCCCATG AGTTTGTGAC CAGCCTGAAC AACATCATGA GACTCCATCT CTACAATAAT	300
TACAAAAATT AATCAGGCAT TGTGGTATGC CCTGTAGTCC CAGATGCTGG ACAAGGTGTC	360
A	361

(2) INFORMATION FOR SEQ ID NO:166:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 427 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:166:

TWGACTGACT CATGTCCCCT ACACCCAACT ATCTTCTCCA GGTGGCCAGG CATGATAGAA	60
TCTGATCCTG ACTTAGGGGA ATATTTTCTT TTTACTTCCC ATCTTGATTC CCTGCCGGTG	120
AGTTTCCTGG TTCAGGGTAA GAAAGGAGCT CAGGCCAAAG TAATGAACAA ATCCATCCTC	180
ACAGACGTAC AGAATAAGAG AACWTGGACW TAGCCAGCAG AACMCAAKTG AAAMCAGAAC	240
MCTTAMCTAG GATRACAAMC MCRRARATAR KTGCYCMCMC WTATAATAGA AACCAAACCTT	300

GTATCTAATT AAATATTTAT CCACYGTCAG GGCATTAGTG GTTTTGATAA ATACGCTTTG 360
GCTAGGATTC CTGAGGTTAG AATGGAARAA CAATTGCAMC GAGGGTAGGG GACATGAGTC 420
AKTCTAA 427

(2) INFORMATION FOR SEQ ID NO:167:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 500 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:167:

AACGTCGCAT GCTCCCGGCC GCCATGGCCG CGGGATAGAC TGACTCATGT CCCCTAAGAT 60
AGAGGAGACA CCTGCTAGGT GTAAGGAGAA GATGGTTAGG TCTACGGAGG CTCCAGGGTG 120
GGAGTAGTTC CCTGCTAAGG GAGGGTAGAC TGTTC AACCT GTTCCTGCTC CGGCCTCCAC 180
TATAGCAGAT GCGAGCAGGA GTAGGAGAGA GGGAGGTAAG AGTCAGAAGC TTATGTTGTT 240
TATGCGGGGA AACGCCRTAT CGGGGGCAGC CRAGTTATTA GGGGACANTR TAGWYARTCW 300
AGNTAGCATC CAAAGCGNGG GAGTTNTCCC ATATGGTTGG ACCTGCAGGC GGCCGCATTA 360
GTGATTAGCA TGTGAGCCCC AGACACGCAT AGCAACAAGG ACCTAACTC AGATCCTGTG 420
CTGATTACTT AACATGAATT ATTGTATTTA TTAAACAACT TTGAGTTATG AGGCATATTA 480

TTAGGTCCAT ATTACCTGGA

500

(2) INFORMATION FOR SEQ ID NO:168:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 358 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:168:

TTCATCGCTC GGTGACTCAA GCCTGTAATC CCAGAACTTT GGGAGGCCGA GGGGAGCAGA	60
TCACCTGAGG TTGGGAGTTT GAGACCAGCC TGGCCAACAT GGTGACAACC CGTCTCTGCT	120
AAAAATACAA AAATTAGCCA AGCATGGTGG CATGCACTTG TAATCCCAGC TACTCGGGAG	180
GCTGAGGCAG GAGAATCACT TGAGGCCAGG AGGCAGAGGT TGCAGTGAGG CAGAGGTTGA	240
GATCATGCCA CTGCACTCCA GCCTGGGCAA CAGAGTAAGA CTCCATCTCA AAAAAAAAAA	300
AAAAAAGAA TGATCAGAGC CACAAATACA GAAACCTTG AGTCACCGAG CGATGAAA	358

(2) INFORMATION FOR SEQ ID NO:169:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1265 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:169:

TTCTGTCCAC ACCAATCTTA GAGCTCTGAA AGAATTTGTC TTAAATATC TTTAATAGT	60
AACATGTATT TTATGGACCA AATTGACATT TTCGACTATT TTTCCCAA AAAAGTCAGG	120
TGAATTCAG CACACTGAGT TGGGAATTC TTATCCAGA AGWCGGCACG AGCAATTCA	180
TATTTATTTA AGATTGATTC CATACTCCGT TTTCAAGGAG AATCCCTGCA GTCTCCTAA	240
AGGTAGAACA AATACTTTCT ATTTTTTTTT CACCATTGTG GGATTGGACT TTAAGAGGTG	300
ACTCTAAAA AACAGAGAAC AAATATGTCT CAGTTGTATT AAGCACGGAC CCATATTATC	360
ATATTCACCT AAAAAATGA TTTCTGTGC ACCTTTTGGC AACTTCTCTT TTCAATGTAG	420
GGAAAACTT AGTCACCCTG AAAACCCACA AAATAAATAA AACTTGTAGA TGTGGGCAGA	480
ARGTTTGGG GTGGACATTG TATGTGTTA AATTAAACCC TGTATCACTG AGAAGCTGTT	540
GTATGGGTCA GAGAAATGA ATGCTTAGAA GCTGTTTACA TCTCAAGAG CAGAAGCAAA	600
CCACATGTCT CAGCTATATT ATTATTTATT TTTTATGCAT AAAGTGAATC ATTTCTTCTG	660
TATTAATTC CAAAGGGTTT TACCCTCTAT TAAATGCTT TGAAAAACAG TGCATTGACA	720
ATGGGTGAT ATTTTCTTT AAAAGAAAA TATAATTATG AAAGCCAAGA TAATCTGAAG	780
CCTGTTTTAT TTTAAACTT TTTATGTTCT GTGGTTGATG TTGTTTGTG GTTTGTTTCT	840
ATTTGTGGG TTTTACTT TGTTTTTGT TTTGTTTGT TTTGGTTDG CATACTACAT	900
GCAGTTTCTT TAACCAATGT CTGTTTGGCT AATGTAATTA AAGTTGTAA TTTATATGAG	960
TGCATTTCAA CTATGTCAAT GGTTCCTAA TATTTATTGT GTAGAAGTAC TGGTAATTTT	1020
TTTATTACA ATATGTTAA AGAGATAACA GTTTGATATG TTTTCATGTG TTTATAGCAG	1080

AAGTTATTTA TTTCTATGGC ATTCCAGCGG ATATTTTGGT GTTTGCGAGG CATGCAGTCA 1140
ATATTTTGTA CAGTTAGTGG ACAGTATTCA GCAACGCCTG ATAGCTTCTT TGGCCTTATG 1200
TTAAATAAAA AGACCTGTTT GGGATGTAAA AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA 1260
AAAAA 1265

(2) INFORMATION FOR SEQ ID NO:170:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 383 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:170:

TGTAAGTCGA GCAGTGTGAT GACGATATTC TTCTTATTAA TGTGGTAATT GAACAAATGA 60
TCTGTGATAC TGATCCTGAG CTAGGAGGCG CTGTTCAAGT AATGGGACTT CTCGTACTC 120
TAATTGATCC AGAGAACATG CTGGCTACAA CTAATAAAAC CGAAAAAAGT GAATTTCTAA 180
ATTTTTTCTA CAACCATTTG ATGCATGTTT TCACAGCACC ACTTTTGACC AATACTTCAG 240
AAGACAAATG TGAAAAGGAT AATATAGTTG GATCAAACAA AAACAACACA ATTTGTCCCG 300
ATAATTATCA AACAGCACAG CTAATTGCCT TAATTTTAGA GTTACTCACA TTTTGTGTGG 360
AACATCACAC TGCTCGACTT ACA 383

(2) INFORMATION FOR SEQ ID NO:171:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 383 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:171:

TGGGCACCTT CAATATCGCA AGTAAAAAT AATGTTGAGT TTATTATACT TTTGACCTGT	60
TTAGCTCAAC AGGGTGAAGG CATGTAAAGA ATGTGGACTT CTGAGGAATT TTCTTTTAAA	120
AAGAACATAA TGAAGTAACA TTTTAATTAC TCAAGGACTA CTTTGGTTG AAGTTTATAA	180
TCTAGATACC TCTACTTTTT GTTTTGCTG TTCGACAGT CACAAAGACC TTCAGCAATT	240
TACAGGGTAA AATCGTTGAA GTAGTGGAGG TGAAACTGAA ATTTAAATTT ATTCTGTAAA	300
TACTATAGGG AAAGAGGCTG AGCTTAGAAT CTTTGGTTG TTCATGTGTT CTGTGCTCTT	360
ATCATCACAC TGCTCGACTT ACA	383

(2) INFORMATION FOR SEQ ID NO:172:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 699 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:172:

TCGGGTGATG CCTCCTCAGG CTTGTCGTTA GTGTACACAG AGCTGCTCAT GAAGCGACAG	60
---	----

CGGCTGCCCC TGGCACTTCA GAACCTCTTC CTCTACACTT TTGGTGGCT TCTGAATCTA	120
GGTCTGCATG CTGGCGGCGG CTCTGGCCCA GGCCTCCTGG AAAGTTTCTC AGGATGGGCA	180
GCACTCGTGG TGCTGAGCCA GGCATAAAT GGAAGTCTCA TGTCTGCTGT CATGGAGCAT	240
GGCAGCAGCA TCACACGCCT CTTTGTGGTG TCCTGCTCGC TGGTGGTCAA CGCCGTGCTC	300
TCAGCAGTCC TGCTACGGCT GCAGCTCACA GCCGCTTCT TCCTGGCCAC ATTGCTCATT	360
GGCCTGGCCA TGGCCTGTA CTATGGCAGC CGTAGTCCC TGACAACTTC CACCCTGATT	420
CCGGACCCTG TAGATTGGGC GCCACCACCA GATCCCCCTC CCAGGCCTTC CTCCTCTCC	480
CATCAGCGGC CCTGTAACAA GTGCCTGTG AGAAAAGCTG GAGAAGTGAG GGCAGCCAGG	540
TTATTCTCTG GAGGTTGGTG GATGAAGGGG TACCCCTAGG AGATGTGAAG TGTGGTTTG	600
GTAAAGGAAA TGCTTACCAT CCCCCACCC CAACCAAGTT NTTCCAGACT AAAGAATTAA	660
GGTAACATCA ATACCTAGGC CTGAGGAGGC ATCACCCGA	699

(2) INFORMATION FOR SEQ ID NO:173:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 701 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:173:

TCGGGTGATG CCTCCTCAGG CCAGATCAAA CTGGGGTTG AAACTGTGC AAAGAAATCA	60
ATGTCGGAGA AAGAATTTTG CAAAAGAAAA ATGCCTAATC AGTACTAATT TAATAGGTCA	120

CATTAGCAGT GGAAGAAGAA ATGTTGATAT TTTATGTCAG CTATTTTATA ATCACCAGAG 180
TGCTTAGCTT CATGTAAGCC ATCTCGTATT CATTAGAAAT AAGAACAATT TTATTCGTCG 240
GAAAGAACTT TTCAATTTAT AGCATCTTAA TTGCTCAGGA TTTTAAATTT TGATAAAGAA 300
AGCTCCACTT TTGGCAGGAG TAGGGGGCAG GGAGAGAGGA GGCTCCATCC ACAAGGACAG 360
AGACACCAGG GCCAGTAGGG TAGCTGGTGG CTGGATCAGT CACAACGGAC TGACTTATGC 420
CATGAGAAGA AACAACTCC AAATCTCAGT TGCTTAATAC AACACAAGCT CATTTCTTGC 480
TCACGTTACA TGTCTATGT AGATCAACAG CAGGTGACTC AGGGACCCAG GCTCCATCTC 540
CATATGAGCT TCCATAGTCA CCAGGACACG GGCTCTGAAA GTGTCCTCCA TGCAGGGACA 600
CATGCCTCTT CCTTTCATTG GGCAGAGCAA GTCACTTATG GCCAGAAGTC AACTGCAGG 660
GCAGTGCCAT CCTGCTGTAT GCCTGAGGAG GCATCACCCG A 701

(2) INFORMATION FOR SEQ ID NO:174:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 700 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:174:

TCGGGTGATG CCTCTCANG CCCCTAAATC AGAGTCCAGG GTCAGAGCCA CAGGAGACAG 60
GGAAAGACAT AGATTTTAAC CGGCCCCCTT CAGGAGATTC TGAGGCTCAG TTCAC TTTGT 120

150

TGCAGTTTGA ACAGAGGCAG CAAGGCTAGT GGTTAGGGGC ACGGTCTCTA AAGCTGCACT	180
GCCTGGATCT GCCTCCCAGC TCTGCCAGGA ACCAGCTGCG TGGCCTTGAG CTGCTGACAC	240
GCAGAAAGCC CCCTGTGGAC CCAGTCTCCT CGTCTGTAAG ATGAGGACAG GACTCTAGGA	300
ACCCTTTCCC TTGGTTTGGC CTCACCTTCA CAGGCTCCCA TCTTGAATC TATCTACTCT	360
TTTCCTGAAA CCTTGTA AAAAAGTG CTAGCCTGGG CAACATGGCA AAACCCTGTC	420
TCTACAAAA ATACAAAAAT TAGTTGGGTG TGGTGGCATG TGCCTGTAGT CCCAGCCACT	480
TGGGAGGTGC TGAGGTGGGA GGATCACTTG AGCCCGGGAG GTGGAGGTTG CAGTGAGCCA	540
AGATCATGCC ACTGCACTCC AGCCTGAGTA ATAGAGTAAG ACTCTGTCTC AAAACAACA	600
ACAACAACAG TGAGTGTGCC TCTGTTCCG GGTGGATGG GGCACCACAT TTATGCATCT	660
CTCAGATTG GACGCTGCAG CCTGAGGAGG CATCACCCGA	700

(2) INFORMATION FOR SEQ ID NO:175:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 484 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:175:

TATAGGGCGA ATTGGGCCCG AGTTGCATGN TCCCGGCCGC CATGGCCGCG GGATTCGGGT	60
GATGCCTCCT CAGGCTTGTC TGCCACAAGC TACTTCTCTG AGCTCAGAAA GTGCCCTTG	120
ATGAGGGAAA ATGTCCTACT GCACTGCGAA TTTCTCAGTT CCATTTTACC TCCCAGTCCT	180

CCTTCTAAAC CAGTTAATAA ATTCATTCCA CAAGTATTTA CTGATTACCT GCTTGTGCCA	240
GGGACTATTC TCAGGCTGAA GAAGGTGGGA GGGGAGGGCG GAACCTGAGG AGCCACCTGA	300
GCCAGCTTTA TATTTCAACC ATGGCTGGCC CATCTGAGAG CATCTCCCA CTCTGCCAA	360
CCTATCGGGG CATAGCCCAG GGATGCCCC AGGCGGCCCA GGTTAGATGC GTCCCTTTGG	420
CTTGTCAGTG ATGACATACA CCTTAGCTGC TTAGCTGGTG CTGGCCTGAG GAGGCATCAC	480
CCGA	484

(2) INFORMATION FOR SEQ ID NO:176:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 432 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:176:

TCGGGTGATG CCTCCTCAGG GCTCAAGGGA TGAGAAGTGA CTTCTTTCTG GAGGGACCGT	60
TCATGCCACC CAGGATGAAA ATGGATAGGG ACCCACTTGG AGGACTTGCT GATATGTTTG	120
GACAAATGCC AGGTAGCGGA ATTGGTACTG GTCCAGGAGT TATCCAGGAT AGATTTTCAC	180
CCACCATGGG ACGTCATCGT TCAAATCAAC TCTTCAATGG CCATGGGGGA CACATCATGC	240
CTCCACACA ATCGCAGTTT GGAGAGATGG GAGGCAAGTT TATGAAAAGC CAGGGGCTAA	300
GCCAGCTCTA CCATAACCAG AGTCAGGGAC TCTTATCCCA GCTGCAAGGA CAGTCGAAGG	360

ATATGCCACC TCGGTTTTCT AAGAAAGGAC AGCTTAATGC AGATGAGATT AGCCTGAGGA 420

GGCATCACCC GA 432

(2) INFORMATION FOR SEQ ID NO:177:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 788 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:177:

TAGCATGTTG AGCCCAGACA CAGTAGCATT TGTGCCAATT TCTGGTTGGA ATGGTGACAA 60

CATGCTGGAG CCAAGTGCTA ACATGCCTTG GTTCAAGGGA TGGAAAGTCA CCCGTAAGGA 120

TGGCAATGCC AGTGAACCA CGCTGCTTGA GGCTCTGGAC TGCATCCTAC CACCAACTCG 180

CCCAACTGAC AAGCCCTTGC GCCTGCCTCT CCAGGATGTC TACAAAATTG GTGGTATTGG 240

TACTGTTCTT GTTGGCCGAG TGGAGACTGG TGTCTCAAA CCCGGTATGG TGGTCACCTT 300

TGCTCCAGTC AACGTTACAA CGGAAGTAAA ATCTGTCGAA ATGCACCATG AAGCTTTGAG 360

TGAAGCTCTT CCTGGGGACA ATGTGGGCTT CAATGTCAAG AATGTGTCTG TCAAGGATGT 420

TCGTCGTGGC AACGTTGCTG GTGACAGCAA AAATGACCCA CCAATGGAAG CAGCTGGCTT 480

CACTGCTCAG GTGATTATCC TGAACCATCC AGGCCAAATA AGTGCCGGCT ATGCCCTGT 540

ATTGGATTGC CACACGGCTC ACATTGCATG CAAGTTTGCT GAGCTGAAGG AAAAGATTGA 600

TCGCCGTTCT GGTAAAAAGC TGGAAGATGG CCCTAAATTC TTGAAGTCTG GTGATGCTGC 660

CATTGTTGAT ATGGTTCCTG GCAAGCCCAT GTGTGTTGAG AGCTTCTCAG ACTATCCACC 720
TTTGGGTCGC TTTGCTGTTT GTGATATGAG ACAGACAGTT GCGGTGGGTG TCTGGGCTCA 780
ACATGCTA 788

(2) INFORMATION FOR SEQ ID NO:178:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 786 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:178:

TAGCATGTTG AGCCCAGACA CCTGTGTTTC TGGGAGCTCT GGCAGTGGCG GATTCATAGG 60
CACTTGGGCT GCACTTTGAA TGACACACTT GGCTTTATTA GATTCACTAG TTTTAAAAA 120
ATTGTTGTTT GTTCTTTTC ATTAAAGGTT TAATCAGACA GATCAGACAG CATAATTTTG 180
TATTTAATGA CAGAAACGTT GGTACATTTT TTCATGAATG AGCTTGCATT CTGAAGCAAG 240
AGCCTACAAA AGGCACTTGT TATAAATGAA AGTTCTGGCT CTAGAGGCCA GTACTCTGGA 300
GTTTCAGAGC AGCCAGTGAT TGTCCAGTC AGTGATGCCT AGTTATATAG AGGAGGAGTA 360
CACTGTGCAC TCTCTAGGT GTAAGGGTAT GCAACTTTGG ATCTTAAAT TCTGTACACA 420
TACACACTTT ATATATATGT ATGTATGTAT GAAACATGA AATTAGTTTG TCAAATATGT 480
GTGTGTTTAG TATTTAGCT TAGTGCAACT ATTTCCACAT TATTTATTAA ATTGATCTAA 540

GACACTTTCT TGTGACACC TTGAATATTA ATGTTCAAGG GTGCAATGTG TATTCCTTTA 600
GATTGTAAAA GCTTAATTAC TATGATTGT AGTAAATTAA CTTTAAAAAT GTATTGAGC 660
CCTTCTGTAG TGTCGTAGGG CTCTACAGG GTGGGAAAGA TTTTAATTTT CCAGTTGCTA 720
ATTGAACAGT ATGGCCTCAT TATATATTTT GATTATAGG AGTTTGTGTC TGGGCTCAAC 780
ATGCTA 786

(2) INFORMATION FOR SEQ ID NO:179:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 796 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:179:

TAGCATGTTG AGCCCAGACA CTGGTTACAA GACCAGACCT GCTTCCTCCA TATGTAAACA 60
GCTTTTAAAA AGCCAGTGAA CCTTTTAAT ACTTTGGCA CTTCTTTCA CAGGCAAAGA 120
ACACCCCAT CCGCCCTTG TTTGGAGTGC AGAGTTTGGC TTTGGTTCTT TGCCTTGCTT 180
GGAGTATACT TCTAATTCCT GTTGTCTGC ACAAGCTGAA TACCGAGCTA CCCACCGCCA 240
CCCAGGCCAG GTTCCACTC ATTTATTACT TTATGTTTCT GTTCCATTGC TGGTCCACAG 300
AAATAAGTTT TCCTTTGGAG GAATGTGATT ATACCCCTTT AATTCCTCC TTTTGCTTTT 360
TTTAATATC ATTGGTATGT GTTTGGCCCA GAGGAACTG AAATTCACCA TCATCTTGAC 420
TGGCAATCCC ATTACCATGC TTTTTTAAA AAACGTAATT TTTCTTGCCT TACATTGGCA 480

GAGTAGCCCT TCCTGGCTAC TGGCTTAATG TAGTCACTCA GTTCTAGGT GGCATTAGGC	540
ATGAGACCTG AAGCACAGAC TGTCTTACCA CAAAAGGTGA CAAGATCTCA AACCTTAGCC	600
AAAGGGCTAT GTCAGGTTTC AATGCTATCT GCTTCTGTTC CTGCTCACTG TTCTGGATT	660
TGTCCTTCTT CATCCCTAGC ACCAGAATTT CCCAGTCTCC CTCCCTACCT TCCCTTGTTT	720
TAATTCTAAT CTATCAGCAA AATAACTTTT CAAATGTTTT AACCGGTATC TCCATGTGTC	780
TGGGCTCAAC ATGCTA	796

(2) INFORMATION FOR SEQ ID NO:180:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 488 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:180:

GGATGTGCTG CAAGGCGATT AAGTTGGGTA ACGCCAGGGT TTTCCCAGTC ACGACGTTGT	60
AAAACGACGG CCAGTGAATT GTAATACGAC TCACTATAGG GCGAATTGGG CCCGACGTCG	120
CATGCTCCCG GCCGCCATGG CCGCGGGATA GCATGTTGAG CCCAGACACC TGCAGGTCAT	180
TTGGAGAGAT TTTTCACGTT ACCAGCTTGA TGGTCTTTTT CAGGAGGAGA GACACTGAGC	240
ACTCCAAGG TGAGGTTGAA GATTTCTCT AGATAGCCGG ATAAGAAGAC TAGGAGGGAT	300
GCCTAGAAAA TGATTAGCAT GCAAATTTCT ACCTGCCATT TCAGAACTGT GTGTCAGCCC	360

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ACATTCAGCT GCTTCTTG TG AACTGAAAAG AGAGAGGTAT TGAGACTTTT CTGATGGCCG 420
CTCTAACATT GTAACACAGT AATCTGTGTG TGTGTGGGTG TGTGTGTGTG TCTGGGCTCA 480
ACATGCTA 488

(2) INFORMATION FOR SEQ ID NO:181:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 317 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:181:

TAGCATGTTG AGCCAGACA CGGCGACGGT ACCTGATGAG TGGGGTGATG GCACCTGTGA 60
AAAGGAGGAA CGTCATCCCC CATGATATTG GGGACCCAGA TGATGAACCA TGGCTCCGCG 120
TCAATGCATA TTTAATCCAT GATACTGCTG ATTGGAAGGA CCTGAACCTG AAGTTTGTGC 180
TGCAGGTTTA TCGGGACTAT TACCTCACGG GTGATCAAAA CTCCTGAAG GACATGTGGC 240
CTGTGTGTCT AGTAAGGGAT GCACATGCAG TGGCCAGTGT GCCAGGGGTA TGGTTGGTGT 300
CTGGGCTCAA CATGCTA 317

(2) INFORMATION FOR SEQ ID NO:182:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 507 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:182:

TAGCATGTTG AGCCCAGACA CTGGCTGTTA GCCAAATCCT CTCTCAGCTG CTCCTGTGG	60
TTTGGTGACT CAGGATTACA GAGGCATCCT GTTTCAGGGA AAAAAAGAT TTTAGCTGCC	120
AGCAGAGAGC ACCACATACA TTAGAATGGT AAGGACTGCC ACCTCCTTCA AGAACAGGAG	180
TGAGGGTGGT GGTGAATGGG AATGGAAGCC TGCATTCCTT GATGCATTG TGCTCTCTCA	240
AATCCTGTCT TAGTCTTAGG AAAGGAAGTA AAGTTTCAAG GACGGTTCCG AACTGCTTTT	300
TGTGTCTGGG CTCAACATGC TATCCCGCGG CCATGGCGGC CGGGAGCATG CGACGTCGGG	360
CCCAATTGCG CCTATAGTGA GTCGTATTAC AATTCAGTGG CCGTCGTTTT ACAACGTCGT	420
GACTGGGAAA ACCCTGGCGT TACCCAATT AATCGCCTTG CAGCACATCC CCCTTTCCCA	480
GCTGGCGTAA TANGGAAAAG GCCCGCA	507

(2) INFORMATION FOR SEQ ID NO:183:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 227 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:183:

GATTACGCT GCAACACTGT GGAGGTAGCC CTGGAGCAAG GCAGGCATGG ATGCTTCTGC	60
AATCCCCAAA TGGAGCCTGG TATTCAGCC AGGAATCTGA GCAGAGCCCC CTCTAATTGT	120

AGCAATGATA AGTTATTCTC TTGTTCTTC AACCTTCAA TAGCCTTGAG CTCCAGGGG 180

AGTGTCGTTA ATCATTACAG CCTGGTCTCC ACAGTGTGC AGCGTAA 227

(2) INFORMATION FOR SEQ ID NO:184:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 225 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:184:

TTACGCTGCA ACACTGTGGA GCAGATTAAC ATCAGACTTT TCTATCAACA TGACTGGGGT 60

TACTAAAAAG ACAACAAATC AATGGCTTCA AAAGCTAAG GAATAATTC GATACTTCAA 120

CTTTATAAAA CCTGACAAAA CTATCAATCA AGCATAAAGA CAGATGAAGA ACATTCCAG 180

ATTTTGGCCA ATCAGATATT TTACCTCCAC AGTGTTCAG CGTAA 225

(2) INFORMATION FOR SEQ ID NO:185:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 597 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:185:

GGCCCGACGT CGCATGCTCC CGGCCGCCAT GGCCGCGGGA TTCGTTAGGG TCTCTATCCA 60

CTGGGACCCA TAGGCTAGTC AGAGTATTTA GAGTTGAGTT CCTTTCTGCT TCCCAGAATT 120
TGAAAGAAAA GGAGTGAGGT GATAGAGCTG AGAGATCAGA TTTGCCTCTG AAGCCTGTTT 180
AAGATGTATG TGCTCAGACC CCACCACTGG GGCCTGTGGG TGAGGTCCTG GGCATCTATT 240
TGAATGAATT GCTGAAGGGG AGCACTATGC CAAGGAAGGG GAACCCATCC TGGCACTGGC 300
ACAGGGGTCA CCTTATCCAG TGCTCAGTGC TTCTTTGCTG CTACCTGGTT TTCTCTCATA 360
TGTGAGGGGC AGGTAAGAAG AAGTGCCCRG TGTTGTGCGA GTTTTAGAAC ATCTACCAGT 420
AAGTGGGGAA GTTTCACAAA GCAGCAGCTT TGTTTTGTGT ATTTTCACCT TCAGTTAGAA 480
GAGGAAGGCT GTGAGATGAA TGTTAGTTGA GTGGAAAAGA CGGGTAAGCT TAGTGGATAG 540
AGACCCTAAC GAATCACTAG TCGGCCGCC TTGCAGGTCG ACCATATGGG AGAGCTC 597

(2) INFORMATION FOR SEQ ID NO:186:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 597 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:186:

GGCCCGAAGT TGCATGTCC CGGCCGCCAT GGCCGCGGGA TTCGTTAGGG TCTCTATCCA 60
CTACCTAAAA AATCCCAAAC ATATACTGA ACTCCTCACA CCCAATTGGA CCAATCCATC 120
ACCCAGAGG CCTACAGATC CTCCTTTGAT ACATAAGAAA ATTTCCCAA ACTACCTAAC 180

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TATATCATTT TGCAAGATTT GTTTTACCAA ATTTTGATGG CCTTTCTGAG CTTGTCAGTG	240
TGAACCACTA TTACGAACGA TCGGATATTA ACTGCCCTC ACCGTCCAGG TGTAAGTGGC	300
AACATCAAGT GCAGTAAATA TTCATTAAGT TTTACCTAC TAAGGTGCTT AACACCCTA	360
GGGTGCCATG TCGGTAGCAG ATCTTTTGAT TTGTTTTTAT TTCCATAAG GGTCTGTTC	420
AAGGTCAATC ATACATGTAG TGTGAGCAGC TAGTCACTAT CGCATGACTT GGAGGTGAT	480
AATAGAGGCC TCCTTTGCTG TTAAAGAACT CTTGTCCCAG CCTGTCAAAG TGGATAGAGA	540
CCCTAACGAA TCACTAGTGC GGCCGCCTGC AGGTCGACCA TATGGGAGAG CTCCCAA	597

(2) INFORMATION FOR SEQ ID NO:187:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 324 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:187:

TCGTTAGGGT CTCTATCCAC TTGCAGGTAA AATCCAATCC TGTGTATATC TTATAGTCTT	60
CCATATGTAG TGGTTCAAGA GACTGCAGTT CCAGAAAGAC TAGCCGAGCC CATCCATGTC	120
TTCCAATTAA CCCTGCTTTG GGTACACAT CTTAACTTTT CTGTTCAAGT TTCTCTGTGT	180
AGTTTATAGC ATGAGTATTG GGAWAATGCC CTGAAACCTG ACATGAGATC TGGGAAACAC	240
AAACTTACTC AATAAGAATT TCTCCCATAT TTTTATGATG GAAAAATTTC ACATGCACAG	300
AGGAGTGGAT AGAGACCCTA ACGA	324

(2) INFORMATION FOR SEQ ID NO:188:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 178 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:188:

```
GCGCGGGGAT TCGGGGTGAT ACCTCCTCAT GCCAAAATAC AACGTNTAAT TTCACAACTT    60
GCCTTCCAAT TTACGCATTT TCAATTGCT CTCCCATTG GTTGAGTCAC AACAAACACC    120
ATTGCCCAGA AACATGTATT ACCTAACATG CACATACTCT TAAACTACT CATCCCTT    178
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(2) INFORMATION FOR SEQ ID NO:189:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 367 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:189:

```
TGACACCTTG TCCAGCATCT GACACAGTCT TGGCTCTTGG AAAATATTGG ATAAATGAAA    60
ATGAATTTCT TTAGCAAGTG GTATAAGCTG AGAATATACG TATCACATAT CCTCATTCTA    120
AGACACATTC AGTGTCCCTG AAATTAGAAT AGGACTTACA ATAAGTGTGT TCACTTTCTC    180
AATAGCTGTT ATTCAATTGA TGGTAGGCCT TAAAAGTCAA AGAAATGAGA GGGCATGTGA    240
```

AAAAAAGCTC AACATCACTG ATCATTAGAA AACTTCCATT CAAACCCCA ATGAGATACC 300
ATCTCATACC AGTCAGAATG GCTATTATTA AAAAGTCAAA AAATAACAGA TGCTGGACAA 360
GGTGTC A 367

(2) INFORMATION FOR SEQ ID NO:190:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 369 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:190:

GACACCTTGT CCAGCATCTG ACAACGCTAA CAGCCTGAGG AGATCTTTAT TTATTTATTT 60
AGTTTTTACT CTGGCTAGGC AGATGGTGGC TAAACATTC ATTTACCCAT TTATTCATTT 120
AATTGTTTCT GCAAGGCCTA TGGATAGAGT ATTGTCCAGC ACTGCTCTGG AAGCTAGGAG 180
CATGGGGATG AACAAGATAG GCTACATCCT GTTCCACAG AACTTCCACT TTAGTCTGGG 240
AAACAGATGA TATATACAAA TATATAAATG AATTCAGGTA GTTTTAAGTA CGAAAAGAAT 300
AAGAAAGCAG AGTCATGATT TANAATGCTG GAAACAGGGG CTATTGCTTG AGATATTGAA 360
GGTGCCCAA 369

(2) INFORMATION FOR SEQ ID NO:191:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 369 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:191:

TGACACCTTG TCCAGCATCT GCACAGGGAA AAGAACTAT TATCAGAGTG AACAGGCAAC	60
CTACAGAATG GGAGAAAATT TTTGCAATCT ATCCATCTGA CAAAGGGCTA ATATCCAGAA	120
TCTACAAAGA ACTTATACAA ATTTACAAGA AACAAACAAA CAAACAAC TCCTAAAAAGT	180
GGGTGAAGGA TGTGAACAGA CACTTCTCAA AAGAAGACAT TTATGGGGCC AACAAACATA	240
TGAAAAAAG CTCATCATCA CTGGTCACTA GATAATGCA AATCAAAACC ACAATGAGAT	300
ACCATCTCAT TCCAGTTAGA ATGGCAATCA TAAAAAGTC AGGAAACAAC AGATGCTGGA	360
CAAGGTGTC	369

(2) INFORMATION FOR SEQ ID NO:192:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 449 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:192:

TGACGCTTGG CCACTTGACA CTTTCATCTT GCACAGAAAA ACTTCTTTAC AGATTTAATT	60
CAAGACTGGT CTAGTGACAG TCCTCCAGAC ATTTTTCAT TTGTTCCATA TACGTGGAAT	120

TTTAAATCA TGTTCATCA GTTTGAAATG ATTTGGGCTG CTAATCAACA CAATTGGATC 180
GACTGTTCTA CTAAACAACA GGAAATGTG TATCTGGCAG CCTGTGGAGA AACACTAAAC 240
ATTGATTTTT CTTTGCCTTT TACGGACTTT GTTCCAGCTA CATGTAATAC CAAGTTCTCT 300
TTAAGAGGAG AAGATGTTGA TCTTCATTG TTTCTACCAG ACTGCCACCC TAGTAAATAT 360
TCTTTATTTA TGCTGGTAAA AAATTGCCAT CCAAATAAGA TGATTCATGA TACTGGTATT 420
CCTGCTGAGT GTCAAGTGGC CAAGCGTCA 449

(2) INFORMATION FOR SEQ ID NO:193:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 372 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:193:

TGACGCTTGG CCACTTGACA CCAGGGATGT AKCAGTTGAA TATAATCCTG CAATTGTACA 60
TATTGGCAAT TTCCCATCAA ACATTCTAGA AAGAGACAAC CAGGATTGCT AGGCCATAAA 120
AGCTGCAATA AATAACTGGT AATTGCAGTA ATCATTTCAG GCCAATTCAA TCCAGTTTGG 180
CTCAGAGGTG CCTTTGGCTG AGAGAAGAGG TGAGATATAA TGTGTTTTCT TGCAACTTCT 240
TGGAAGAATA ACTCCACAAT AGTCTGAGGA CTAGATACAA ACCTATTTGC CATTAAAGCA 300
CCAGAGTCTG TTAATTCAG TACTGATAAG TGTTGGAGAT TAGACTCCAG TGTGTCAAGT 360
GGCCAAGCGT CA 372

(2) INFORMATION FOR SEQ ID NO:194:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 309 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:194:

TGACGCTTGG CCACTTGACA CTTATGTAGA ATCCATCGTG GGCTGATGCA AGCCCTTTAT	60
TTAGGCTTAG TGTTGTGGG ACCTTCAATA TCACACTAGA GACAAACGCC ACAAGATCTG	120
CAGAAACATT CAGTTCTGAN CACTCGAATG GCAGGATAAC TTTTGTGTT GTAATCCTTC	180
ACATATACAA AAACAACTC TGCANTCTCA CGTTACAAAA AACGTACTG CTGTAAAATA	240
TTAAGAAGGG GTAAAGGATA CCATCTATAA CAAAGTAACT TACAAC TAGT GTCAAGTGGC	300
CAAGCGTCA	309

(2) INFORMATION FOR SEQ ID NO:195:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 312 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:195:

TGACGCTTGG CCACTTGACA CCCAATCTCG CACTTCATCC TCCCAGCACC TGATGAAGTA	60
---	----

GGACTGCAAC TATCCCCACT TCCCAGATGA GGGGACCAAN GTACACATTA GGACCCGGAT 120
GGGAGCACAG ATTTGTCCGA TCCCAGACTC CAAGCACTCA GCGTCACTCC AGGACAGCGG 180
CTTTCAGATA AGGTCACAAA CATGAATGGC TCCGACAACC GGAGTCAGTC CGTGCTGAGT 240
TAAGGCAATG GTGACACGGA TGCACGTGTN ACCTGTAATG GTTCATCGTA AGTGTCAAGT 300
GGCCAAGCGT CA 312

(2) INFORMATION FOR SEQ ID NO:196:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 288 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:196:

TGTATCGACG TAGTGGTCTC CTCAGCCATG CAGAACTGTG ACTCAATTAA ACCTCTTTCC 60
TTTATGAATT ACCCAATCTC GGGTAGTGTC TTTATAGTAG TGTGAGAATG GACTAATACA 120
AGTACATTTT ACTTAGTAAT AATAATAAAC AAATATATTA CATTTTGTG TATTTACTAC 180
ACCATATTTT TTATTGTTAT TGTAGTGAC ACCTTCTACT TATTAAAGA AATAGGCCCG 240
AGGCGGGCAG ATCACGAGGT CAGGAGATGG AGACCACTAC GTCGATAC 288

(2) INFORMATION FOR SEQ ID NO:197:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 289 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:197:

TTGGGCACCT TCAATATCAT GACAGGTGAT GTGATAACCA AGAAGGCTAC TAAGTGATTA	60
ATGGGTGGGT AATGTATACA GAGTAGGTAC ACTGGACAGA GGGGTAATTC ATAGCCAAGG	120
CAGGAGAAGC AGAATGGCAA AACATTTTCAT CACACTACTC AGGATAGCAT GCAGTTTAAA	180
ACCTATAAGT AGTTTATTTT TGAATTTTC CACTTAATAT TTTCAGACTG CAGGTAAC TA	240
AACTGTGGAA CACAAGAACA TAGATAAGGG GAGACCACTA CGTCGATAC	289

(2) INFORMATION FOR SEQ ID NO:198:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 288 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:198:

GTATCGACGT AGTGGTCTCC CAAGCAGTGG GAAGAAAACG TGAACCAATT AAAATGTATC	60
AGATACCCCA AAGAAAGGCG CTTGAGTAAA GATTCCAAGT GGGTCACAAT CTCAGATCTT	120
AAAATTCAGG CTGTCAAAGA GATTGCTAT GAGGTTGCTC TCAATGACTT CAGGCACAGT	180
CGGCAGGAGA TTGAAGCCCT GGCCATTGTC AAGATGAAGG AGCTTTGTGC CATGTATGGC	240

AAGAAAGACC CCAATGAGCG GGA CTCTGG AGACCACTAC GTCGATAC

288

(2) INFORMATION FOR SEQ ID NO:199:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1027 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:199:

GCTTTTGGG AAAACNCAA NTGGGGGAAA GGGGNTTNN TNGCAAGGGG ATAAAGGGGG	60
AANCCAGGG TTTCCCATT CAGGGAGGTG TAAAAAGNCG GCCAGGGGAT TGTAANAGGA	120
TTCAATAATA GGGGAATGG GCCNGAAGT TGCAAGGTTT CNGCCCGCCA TNCCGCGGG	180
ATTTAGTGAC ATTACGACGS TGGTAATAAA GTGGGSCCAA WAAATATTTG TGATGTGATT	240
TTTSGACCAG TGAACCCATT GWACAGGACC TCATTTCTY TGAGATGRTA GCCATAATCA	300
GATAAAAGRT TAGAAGTYTT TCTGCAGTT AACAGCATCA TTAAATGGAG TGGCATCACC	360
AATTTACCC TTTGTTAGCC GATACCTTCC CCTGAAGGC ATTCAATTAA GTGACCAATC	420
GTCATACGAG AGGGGATGGC ATGGGGATTG ATGATGATAT CAGGGGTGAT ACCTTCACAG	480
GTGAAAGGCA TATCCTCTTG TCTATACTGA ATACCACAAG TACCCTTTG ACCATGTCGA	540
CTAGCAAATT TGTCTCCAAT CTGTGTWATC CCTAACAGAG CGTACCCTTA TTTTACAAAA	600
TTTATATCCT TCCTGATTGA GAGTTACCAT AACCTGATCC ACAATGCCG TCTCGCTWGT	660
TCTGAGAAAA GTGCTACAGT CTCTTTGGT ATAGCGTCTA TTGGTGCTCT CCAATTCATC	720

TTCATTTTTC AGGCAAGGTG AACTGTTTTG CCTATAATAA CMTCATCTCC TGATACMCGA	780
AACCCCKGGA RCTATCAAAC CATCATCATC CAGCGTTCKT WATGYMCTA AATCCCTATT	840
GCGGCCGCCT GCAGGTCAAC ATATNGGAAA ACCCCCCACC CCTTNGGAGC NTACCTTGAA	900
TTTTCCATAT GTCCNTAAA TTANCTNGNC TTANCCTGGC CNTAACCTNT TCCGGTTTAA	960
ATTGTTTCCG CCCCNTTCC CCNCCTTNA ACCGGAAACC TTAATTTTNA ACCNNGGGTT	1020
CCTATCC	1027

(2) INFORMATION FOR SEQ ID NO:200:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 207 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:200:

AGTGACATTA CGACGCTGGC CATCTTGAAT CCTAGGGCAT GAAGTTGCCC CAAAGTTCAG	60
CACTTGGTTA AGCCTGATCC CTCTGGTTTA TCACAAAGAA TAGGATGGGA TAAAGAAAGT	120
GGACACTTAA ATAAGCTATA AATTATATGG TCCTTGCTA GCAGGAGACA ACTGCACAGG	180
TATACTACCA GCGTCGTAAT GTCACTA	207

(2) INFORMATION FOR SEQ ID NO:201:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 209 base pairs

170

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:201:

TGGGCACCTT CAATATCTAT TAAAGCACA AATACTGAAG AACACACCAA GACTATCAAT	60
GAGGTTACAT CTGGAGTCCT CGATATATCA GGAAAAATG AAGTGAACAT TCACAGAGTT	120
TTACTTCTTT GGGAAC TAA ATGCTAGAAA AGAAAAGGGT GCCCTCTTTC TCTGGCTTCC	180
TGGTCCTATC CAGCGTCGTA ATGTCACTA	209

(2) INFORMATION FOR SEQ ID NO:202:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 349 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:202:

NTACGCTGCA ACACTGTGGA GCCACTGGTT TTTATTCCCG GCAGGTTATC CAGCAAACAG	60
TCAGTGAACA CACCGAAGAC CGTGGTATGG TAACCGTTCA CAGTAATCGT TCCAGTCGTC	120
TGCGGGACCC CGACGAGCGT CACTGGGTAC AGACCAGATT CAGCCGGAAG AGAAAGCGCC	180
GCAGGGAGAG ACTCGAACTC CACTCCGCTG GTGAGCAGCC CCATGTTTTC AACTCGAAGT	240
TCAAACGGCA TTGGGTTATA TACCATCAGC TGAAC TTCAC ACACATCTCC TTGAACCCAC	300

TGGAAATCTA TTTTCTTGTT CCGCTCTTCT CCACAGTGTT GCAGCGTAA 349

(2) INFORMATION FOR SEQ ID NO:203:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 241 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:203:

TGCTCCTCTT GCCTTACCA CCCAAAGCCC ACTGTGAAAT ATGAAGTGAA TGACAAAATT 60
CAGTTTTCAG CGCAATATAG TATAGTTTAT CTGATTCTTT TGATCTCCAG GACACTTTAA 120
ACAACTGCTA CCACCACCAC CAACCTAGGG ATTAGGATT CTCCACAGAC CAGAAATTAT 180
TTCTCCTTTG AGTTTCAGGC TCCTCTGGGA CTCCTGTTCA TCAATGGGTG GTAAATGGCT 240
A 241

(2) INFORMATION FOR SEQ ID NO:204:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 248 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:204:

TAGCCATTTA CCACCATCT GCAAACCSWG ACMWWCARGR CYWGWACKYA GGCGATTTGA 60

AGTACTGGTA ATGCTCTGAT CATGTTAGTT ACATAAGTGT GGTCAGTTTA CAAAAATTCA	120
CAGAACTAAA TACTCAATGC TATGTGTTCA TGTCTGTGTT TATGTGTGTG TAATGTTTCA	180
ATTAAGTTTT TTTAAAAAAA AGAGATGATT TCCAAATAAG AAAGCCGTGT TGGTAAGGCA	240
AGAGGAGC	248

(2) INFORMATION FOR SEQ ID NO:205:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 505 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:205:

TACGCTGCAA CACTGTGGAG CCATTCATAC AGGTCCTTAA TTAAGGAACA AGTGATTATG	60
CTACCTTTGC ACGGTTAGGG TACCGCGGCC GTTAAACATG TGCTACTGGG CAGGCGGTGC	120
CTCTAATACT GGTGATGCTA GAGGTGATGT TTTTGGTAAA CAGGCGGGGT AAGATTTGCC	180
GAGTTCCTTT TACTTTTTTT AACCTTTCCT TATGAGCATG CCTGTGTTGG GTTGACAGTG	240
GGGGTAATAA TGACTTGTG GTTGATTGTA GATATTGGGC TGTTAATTGT CAGTTCAGTG	300
TTTAAATCTG ACGCAGGCTT ATGCGGAGGA GAATGTTTTC ATGTTACTTA TACTAACATT	360
AGTTCCTTCTA TAGGGTGATA GATTGGTCCA ATTGGGTGTG AGGAGTTCAG TTATATGTTT	420
GGGATTTTTT AGGTAGTGGG TGTGANCTT GAACGCTTTC TTAATTGGTG GCTGCTTTTA	480
RGCCTACTAT GGGTGGTAAA TGGCT	505

(2) INFORMATION FOR SEQ ID NO:206:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 179 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:206:

TAGACTGACT CATGTCCCCT ACCAAAGCCC ATGTAAGGAG CTGAGTTCTT AAAGACTGAA	60
GACAGACTAT TCTCTGGAGA AAAATAAAAT GGAAATTGTA CTTTAAAAAA AAAAAAATC	120
GGCCGGGCAT GGTAGCACAC ACCTGTAATC CCAGCTACTA GGGGACATGA GTCAGTCTA	179

(2) INFORMATION FOR SEQ ID NO:207:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 176 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:207:

AGACTGACTC ATGTCCCCTA CCCACCTTC TGCTGTGCTG CCGTGTCCT AACAGGTCAC	60
AGACTGGTAC TGGTCAGTGG CCTGGGGGTT GGGGACCTCT ATTATATGGG ATACAAATTT	120
AGGAGTTGGA ATTGACACGA TTTAGTGACT GATGGGATAT GGGTGGTAAA TGGCTA	176

(2) INFORMATION FOR SEQ ID NO:208:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 196 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:208:

```
AGACTGACTC ATGTCCCCTA TTTAACAGGG TCTCTAGTGC TGTGAAAAA AAAATGCTG    60
AACATTGCAT ATAATTATA TTGTAAGAAA TACTGTACAA TGACTTTATT GCATCTGGGT    120
AGCTGTAAGG CATGAAGGAT GCCAAGAAGT TTAAGGAATA TGGGTGGTAA ATGGCTAGGG    180
GACATGAGTC AGTCTA                                     196
```

(2) INFORMATION FOR SEQ ID NO:209:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:209:

```
GACGCTTGGC CACTTGACAC CTTTTATTTT TTAAGGATTC TTAAGTCATT TANGTNACTT    60
TGTAAGTTTT TCCTGTGCCC CCATAAGAAT GATAGCTTTA AAAATTATGC TGGGGTAGCA    120
AAGAAGATAC TTCTAGCTTT AGAATGTGTA GGTATAGCCA GGATTCTTGT GAGGAGGGGT    180
GATTTAGAGC AAATTTCTTA TTCTCCTTGC CTCATCTGTA ACATGGGGAT AATAATAGAA    240
```

CTGGCTTGAC AAGGTTGAA TTAGTATTAC ATGGTAAATA CATGTAAAT GTTTAGAATG 300

GTGCCAAGTA TCTAGGAAGT ACTTGGGCAT GGGTGGTAAA TGGCT 345

(2) INFORMATION FOR SEQ ID NO:210:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 178 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:210:

GACGCTTGGC CACTTGACAC TAGAGTAGGG TTTGGCCAAC TTTTCTATA AAGGACCAGA 60

GAGTAAATAT TTCAGGCTTT GTGGGTGTG CAGTCTCTCT TGCAACTACT CAGCTCTGCC 120

ATTGTAGCAT AGAAATCAGC CATAGACAGG ACAGAAATGA ATGGGTGGTA AATGGCTA 178

(2) INFORMATION FOR SEQ ID NO:211:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 454 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:211:

TGGGCACCTT CAATATCTAT CCAGCGCATC TAAATTCGCT TTTTCTTGA TAAAAATTT 60

CACCACTTGC TGTTTTGCT CATGTATACC AAGTAGCAGT GGTGTGAGGC CATGCTTGTT 120

TTTTGATTCTG ATATCAGCAC CGTATAAGAG CAGTGCTTTG GCCATTAATT TATCTTCATT 180
GTAGACAGCA TAGTGTAGAG TGGTATCTCC ATACTCATCT GGAATATTG GATCAGTGCC 240
ATGTTCCAGC AACATTAACG CACATTCATC TTCCTGGCAT TGTACGGCCT TTGTCAGAGC 300
TGTCTCTTT TTGTTGTCAA GGACATTAAG TTGACATCGT CTGTCCAGCA CGAGTTTAC 360
TACTTCTGAA TTCCCATTTG CAGAGGCCAG ATGTAGAGCA GTCCTCTTTT GCTTGTCCTT 420
CTTGTTTACA TCAGTGTCCC TGAGCATAAC GGAA 454

(2) INFORMATION FOR SEQ ID NO:212:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 337 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:212:

TCCGTTATGC CACCCAGAAA ACCTACTGGA GTTACTTATT AACATCAAGG CTGGAACCTA 60
TTTGCCTCAG TCCTATCTGA TTCATGAGCA CATGGTTATT ACTGATCGCA TTGAAAACAT 120
TGATCACCTG GGTTTCTTTA TTTATCGACT GTGTCATGAC AAGGAAACTT ACAAACCTGCA 180
ACGCAGAGAA ACTATTAAAG GTATTCAGAA ACGTGAAGCC AGCAATTGTT TCGCAATTCG 240
GCATTTTGAA AACAAATTTG CCGTGGAAAC TTTAATTTGT TCTTGAACAG TCAAGAAAAA 300
CATTATTGAG GAAAATTAAT ATCACAGCAT AACGGAA 337

(2) INFORMATION FOR SEQ ID NO:213:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 715 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:213:

TCGGGTGATG CCTCCTCAGG CATCTTCCAT CCATCTCTTC AAGATTAGCT GTCCCAAATG	60
TTTTTCCTTC TCTTCTTTAC TGATAAATTT GGACTCCTTC TTGACACTGA TGACAGCTTT	120
AGTATCCTTC TTGTCACCTT GCAGACTTTA AACATAAAAA TACTCATTGG TTTTAAAGG	180
AAAAAAGTAT ACATTAGCAC TATTAAGCTT GGCCTTGAAA CATTTTCTAT CTTTATTAA	240
ATGTCGGTTA GCTGAACAGA ATTCATTTTA CAATGCAGAG TGAGAAAAGA AGGGAGCTAT	300
ATGCATTTGA GAATGCAAGC ATTGTCAAAT AAACATTTTA AATGCTTTCT TAAAGTGAGC	360
ACATACAGAA ATACATTAAG ATATTAGAAA GTGTTTTTGC TTGTGTACTA CTAATTAGGG	420
AAGCACCTTG TATAGTTCCT CTTCTAAAAT TGAAGTAGAT TTTAAAAACC CATGTAATTT	480
AATTGAGCTC TCAGTTCAGA TTTTAGGAGA ATTTTAACAG GGATTGTTT TTGTCTAAAT	540
TTTGCAATT TTTTAGTTA ATCTGTATAA TTTATAAAT GTCAAAGTGT ATTTAGTCCG	600
TTTTCATGCT GCTATGAAAG AAATACCCAN GACAGGGTTA TTTATAAANG GAAAGANGTT	660
AATTGACTC CCAGTTCACA GGCCTGAGGA NGNATCNCCC GAAATCCTTA TTGCG	715

(2) INFORMATION FOR SEQ ID NO:214:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:214:

GGTAANGNGC ATACNTCGGT GCTCCGGCCG CCGGAGTCGG GGGATTCGGG TGATGCCTCC	60
TCAGGCCAC TTGGGCCTGC TTTTCCAAA TGGCAGCTCC TCTGGACATG CCATTCCTTC	120
TCCCACCTGC CTGATTCTTC ATATGTTGGG TGTCCCTGTT TTTCTGGTGC TATTTCTGA	180
CTGCTGTTCA GCTGCCACTG TCCTGCAAAG CCTGCCTTTT TAAATGCCTC ACCATTCCTT	240
CATTTGTTTC TTAAATATGG GAAGTGAAAG TGCCACCTGA GGCCGGGCAC AGTGGCTCAC	300
GCCTGTAATC CCAGCACTTT GGGAGCCTGA GGAGGCATCA CCCGA	345

(2) INFORMATION FOR SEQ ID NO:215:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 429 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:215:

GGTGATGCCT CCTCAGGCGA AGCTCAGGGA GGACAGAAAC CTCCCGTGGA GCAGAAGGGC	60
AAAAGCTCGC TTGATCTTGA TTTTCAGTAC GAATACAGAC CGTGAAAGCG GGGCCTCACG	120

ATCCTTCTGA CCTTTTGGGT TTTAAGCAGG AGGTGTCAGA AAAGTTACCA CAGGGATAAC 180
TGGCTTGTGG CGGCCAAGCG TTCATAGCGA CGTCGCTTTT TGATCCTTCG ATGTCGGCTC 240
TTCCTATCAT TGTGAAGCAG AATTCACCAA GCGTTGGATT GTTCACCCAC TAATAGGGAA 300
CGTGAGCTGG GTTTAGACCG TCGTGAGACA GGTTAGTTTT ACCCTACTGA TGATGTGKKG 360
TTGCCATGGT AATCCTGCTC AGTACGAGAG GAACCGCAGG TTCASACATT TGGTGTATGT 420
GCTTGCCTT 429

(2) INFORMATION FOR SEQ ID NO:216:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 593 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:216:

TGACACCTAT GTCCNGCATC TGTTACAGT TTCCACAAAT AGCCAGCCTT TGGCCACCTC 60
TCTGTCTGA GGTATACAAG TATATCAGGA GGTGTATACC TTCTCTTCTC TTCCCCACCA 120
AAGAGAACAT GCAGGCTCTG GAAGCTGTCT TAGGAGCCTT TGGGCTCAGA ATTTACAGAT 180
CTTGGGTACC TTGGATGTGG TCTGGAAGGA GAAACATTGG CTCTGGATAA GGAGTACAGC 240
CGGAGGAGGG TCACAGAGCC CTCAGCTCAA GCCCCTGTGC CTTAGTCTAA AAGCAGCTTT 300
GGATGAGGAA GCAGGTTAAG TAACATACGT AAGCGTACAC AGGTAGAAAG TGCTGGGAGT 360

180

CAGAATTGCA CAGTGTGTAG GAGTAGTACC TCAATCAATG AGGGCAAATC AACTGAAAGA	420
AGAAGACCNA TTAATGAATT GCTTANGGGG AAGGATCAAG GCTATCATGG AGATCTTTCT	480
AGGAAGATTA TTGTTTANAA TTATGAAAGG ANTAGGGCAG GGACAGGGCC AGAAGTANAA	540
GANAACTTG CCTATANCCC TTGTCTTGCA CCCAGATGCT GGACAAGGTG TCA	593

(2) INFORMATION FOR SEQ ID NO:217:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 335 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:217:

TGACACCTTG TCCAGCATCT GACGTGAAGA TGAGCAGCTC AGAGGAGGTG TCCTGGATTT	60
CCTGGTTCTG TGGGCTCCGT GGCAATGAAT TCTTCTGTGA AGTGGATGAA GACTACATCC	120
AGGACAAATT TAATCTTACT GGA CTCAATG AGCAGGTCCC TCACTATCGA CAAGCTCTAG	180
ACATGATCTT GGACCTGGAG CCTGATGAAG AACTGGAAGA CAACCCCAAC CAGAGTGACC	240
TGATTGAGCA GGCAGCCGAG ATGCTTTATG GATTGATCCA CGCCCGCTAC ATCCTTACCA	300
ACCGTGGCAT CGCCAGATG CTGGACAAGG TGCA	335

(2) INFORMATION FOR SEQ ID NO:218:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 248 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:218:

TACGTACTGG TCTGAAGGT CTTAGGTAGA GAAAAATGT GAATATTTAA TCAAAGACTA	60
TGTATGAAAT GGGACTGTAA GTACAGAGGG AAGGGTGGCC CTTATCGCCA GAAGTTGGTA	120
GATGCGTCCC CGTCATGAAA TGTTGTGTCA CTGCCCGACA TTTGCCGAAT TACTGAAATT	180
CCGTAGAATT AGTGCAAATT CTAACGTTGT TCATCTAAGA TTATGGTTCC ATGTTTCTAG	240
TACTTTTA	248

(2) INFORMATION FOR SEQ ID NO:219:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 530 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:219:

TGACGCTTGG CCACTTGACA CAAGTAGGGG ATAAGGACAA AGACCCATNA GGTGGCCTGT	60
CAGCCTTTTG TTA CTGTGTC TTCCCTGTCA CCACGGCCCC CTCTGTAGGG GTGTGCTGTG	120
CTCTGTGGAC ATTGGTGCAT TTTCACACAT ACCATTCTCT TTCTGCTTCA CAGCAGTCCT	180
GAGGCGGGAG CACACAGGAC TACCTTGTC GATGANGATA ATGATGTCTG GCCAACTCAC	240
CCCCAACCT TCTCACTAGT TATANGAAGA GCCANGCCTA NAACCTTCTA TCCTGNCCCC	300

TTGCCCTATG ACCTCATCCC TGTTCATGC CCTATTCTGA TTTCTGGTGA ACTTTGGAGC	360
AGCCTGGTTT NTCCTCCTCA CTCCAGCCTC TCTCCATACC ATGGTANGGG GGTGCTGTTT	420
CACNCAAANG GTCAGGTGTG TCTGGGGAAT CCTNANANCT GCCNGGAGTT TCCNANGCAT	480
TCTTAAAAAC CTTCTTGCCT AATCANATNG TGTCCAGTGG CCAACCNTCN	530

(2) INFORMATION FOR SEQ ID NO:220:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 531 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:220:

TGACGCTTGG CCACTTGACA CTAAATAGCA TCTTCTAAAG GCCTGATTCA GAGTTGTGGA	60
AAATTCTCCC AGTGTGAGG ATTGTCAGGA ACAGGGCTGC TCCTGTGCTC ACTTTACCTG	120
CTGTGTTTCT GCTGGAAAAG GAGGGAAGAG GAATGGCTGA TTTTACCTA ATGTCTCCCA	180
GTTTTTCATA TTCTTCTTGG ATCCTCTTCT CTGACAACTG TTCCCTTTTG GTCTTCTTCT	240
TCTTGCTCAG AGAGCAGGTC TCTTTAAAC TGAGAAGGGA GAATGAGCAA ATGATTAAAG	300
AAAACACACT TCTGAGGCC AGAGATCAAA TATTAGGTAA ATACTAAACC GCTTGCCTGC	360
TGTGGTCACT TTTCTCTCT TTCACATGCT CTATCCCTCT ATCCCCACC TATTCATATG	420
GCTTTTATCT GCCAAGTTAT CCGGCCTCTC ATCAACCTTC TCCCCTAGCC TACTGGGGGA	480

TATCCATCTG GGTCTGTCTC TGGTGTATTG GTGTCAAGTG GCCAAGCGTC A 531

(2) INFORMATION FOR SEQ ID NO:221:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 530 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:221:

ATTGACGCTT GGCCACTTGA CACCCGCCTG CCTGCAATAC TGGGGCAAGG GCCTTCACTG 60
CTTTCCTGCC ACCAGCTGCC ACTGCACACA GAGATCAGAA ATGCTACCAA CCAAGACTGT 120
TGGTCCTCAG CCTCTCTGAG GAGAAAGAGC AGAAGCCTGG AAGTCAGAAG AGAAGCTAGA 180
TCGGCTACGG CCTTGGCAGC CAGCTTCCCC ACCTGTGGCA ATAAAGTCGT GCATGGCTTA 240
ACAATGGGGG CACCTCCTGA GAAACACATT GTTAGGCAAT TCGGCGTGTG TTCATCAGAG 300
CATATTTACA CAAACCTCGA TAGTGCAGCC TACTATCCAC TATTGCTCCT ACGCTGCAAA 360
CCTGAACAGC ATGGGACTGT ACTGAATACT GGAAGCAGCT GGTGATGGTA CTTATTTGTG 420
TATCTAAACA CAGAGAAGGT ACAGTAAGAA TATGGTATCA TAACTTACA GGGACCGCCA 480
TCCTATATGC AGTCTGTTGT GACCAAAATG TGTCAAGTGG CCAAGCGTCA 530

(2) INFORMATION FOR SEQ ID NO:222:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 578 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:222:

TGTATCGACG TAGTGGTCTC CGGGCTACTA GGCCGTTGTG TGCTGGTAGT ACCTGGTTCA	60
CTGAAAGGCG CATCTCCCTC CCCGCGTCGC CCTGAAGCAG GGGGAGGACT TCGCCCAGCC	120
AAGGCAGTTG TATGAGTTTT AGCTGCGGCA CTTCGAGACC TCTGAGCCCA CCTCCTTCAG	180
GAGCCTTCCC CGATTAAGGA AGCCAGGGTA AGGATTCCTT CCTCCCCCAG ACACCACGAA	240
CAAACCACCA CCCCCCTAT TCTGGCAGCC CATATACATC AGAACGAAAC AAAAATAACA	300
AATAAACNAA AACCAAAAAA AAAAGAGAAG GGGAAATGTA TATGTCTGTC CATCCTGTTG	360
CTTTAGCCTG TCAGCTCCTA NAGGGCAGGG ACCGTGTCTT CCGAATGGTC TGTGCAGCGC	420
CGACTGCGGG AAGTATCGGA GGAGGAAGCA GAGTCAGCAG AAGTTGAACG GTGGGCCCGG	480
CGGCTCTTGG GGGCTGGTGT TGTACTTCGA GACCGCTTTC GCTTTTGTG TTAGATTAC	540
GTTTGCTCTT TGGAGTGGGA NACCACTACN TCNATACA	578

(2) INFORMATION FOR SEQ ID NO:223:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 578 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:223:

TGTATCGACG TAGTGGTCTC CTCTTGCAAA GGACTGGCTG GTGAATGGTT TCCCTGAATT	60
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ATGGACTTAC CCTAAACATA TCTTATCATC ATTACCAGTT GCAAAATATT AGAATGTGTT	120
GTCACTGTTT CATTTGATTC CTAGAAGGT AGTCTTAGAT ATGTTACTTT AACCTGTATG	180
CTGTAGTGCT TTGAATGCAT TTTTGTGTTG CATTTTGTGTT TGCCCAACCT GTCAATTATA	240
GCTGCTTAGG TCTGGACTGT CCTGGATAAA GCTGTAAAAA TATCACCAG TCCAGCCATC	300
TTACAAGCTA ATTAAGTCAA CTAAATGCTT CCTTGTTTTG CCAGACTTGT TATGTCAATC	360
CTCAATTICT GGGTTCATTT TGGGTGCCCT AAATCTTAGG GTGTGACTTT CTTAGCATCC	420
TGTAACATCC ATTCCAAGC AAGCACAAC TCACATAATA CTTTCAGAA GTTCATTGCT	480
GAAGCCTTTC CTTCACCCAG CGGAGCAACT TGATTTTCTA CAACTTCCT CATCAGAGCC	540
ACAAGAGTAT GGGATATGGA GACCACTACG TCGATACA	578

(2) INFORMATION FOR SEQ ID NO:224:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:224:

TGTATCGACG TANTGGTCTC CCAAGGTGCT GGGATTGCAG GCATGAGCCA CCACTCCCAG	60
GTGGATCTTT TTCTTTATAC TTAATTCACT AGGTTTCTGT TATTCAAGAA GTGTAGTGGT	120
AAAAGTCTTT TCAATCTACA TGGTTAAATA ATGATAGCCT GGGAAATAAA TAGAAATTTT	180
TTCTTTCATC TTTAGGTTGA ATAAAGAAAC AGAAAAATA GAACATACTG AAAATAATCT	240

AAGTTCCAAC CATAGAAGAA CTGCAGAAGA AATGAAGAAA GTGATGATGA TTTAGATTTT 300

GATATTGATT TAGAAGACAC AGGAGGAGAC CACTACGTCG ATACA 345

(2) INFORMATION FOR SEQ ID NO:225:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 347 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:225:

TGTATCGACG TAGTGGTCTC CAACTGAGG TATGTGTGCC ACTAGCACAC AAAGCCTTCC 60

AACAGGGACG CAGGCACAGG CAGTTTAAAG GGAATCTGTT TCTAAATTAA TTTCCACCTT 120

CTCTAAGTAT TCTTTCCTAA AACTGATCAA GGTGTGAAGC CTGTGCTCTT TCCCAACTCC 180

CCTTTGACAA CAGCCTTCAA CTAACACAAG AAAAGGCATG TCTGACACTC TTCCTGAGTC 240

TGACTCTGAT ACGTTGTTCT GATGTCTAAA GAGCTCCAGA ACACCAAAGG GACAATTCAG 300

AATGCTGGTG TATAACAGAC TCCAATGGAG ACCACTACGT CGATACA 347

(2) INFORMATION FOR SEQ ID NO:226:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 281 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:226:

AGGNGNGGGA NTGTATCGAC GTAGTGGTCT CCCAACAGTC TGTCATTAG TCTGCAGGTG 60
TCAGTGTTTT GGACAATGAG GCACCATTGT CACTTATTGA CTCCTCAGCT CTAAATGCTG 120
AAATTAATC TTGTCATGAC AAGTCTGGAA TTCCTGATGA GGTTTTACAA AGTATTTTGG 180
ATCAATACTC CAACAAATCA GAAAGCCAGA AAGAGGATCC TTTCAATATT GCAGAACCAC 240
GAGTGGATTT ACACACCTCA GGAGACCACT ACGTCGATAC A 281

(2) INFORMATION FOR SEQ ID NO:227:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 3646 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:227:

GGGAAACACT TCCTCCCAGC CTTGTAAGGG TTGGAGCCCT CTCCAGTATA TGCTGCAGAA 60
TTTTTCTCTC GGTTTCTCAG AGGATTATGG AGTCCGCCTT AAAAAAGGCA AGCTCTGGAC 120
ACTCTGCAAA GTAGAATGGC CAAAGTTTGG AGTTGAGTGG CCCCTTGAAG GGTCAGTGAA 180
CCTCACAATT GTTCAAGCTG TGTGGCGGGT TGTTACTGAA ACTCCCGGCC TCCCTGATCA 240
GTTTCCCTAC ATTGATCAAT GGCTGAGTTT GGTGAGGAGC ACCCCTTCCG TGGCTCCACT 300
CATGCACCAT TCATAATTTT ACCTCCAAGG TCCTCCTGAG CCAGACCGTG TTTTCGCCTC 360
GACCCTCAGC CGGTTCCGCT CGCCCTGTAC TGCCTCTCTC TGAAGAAGAG GAGAGTCTCC 420
CTCACCAGT CCCACCGCCT TAAACCCAGC CTAATCCCTT AGGGTCATCC CATGTCTCCT 480

CGGCTATGTC CCCTGTAGGC TCATCACCCA TTGCCTCTTG GTTGCAACCG TGGTGGGAGG	540
AAGTAGCCCC TCTACTACCA CTGAGAGAGG CACAAGTCCC TCTGGGTGAT GAGTGCTCCA	600
CCCCCTTCCT GGTTCATGTC CCTTCTTTCT ACTTCTGACT TGTATAATTG GAAAACCCAT	660
AATCCTCCCT TCTCTGAAAA GCCCCAGGCT TTGACCTCAC TGATGGAGTC TGTACTCTGG	720
ACACATTGGC CCACCTGGGA TGA CTGTCAA CAGCTCCTTT TGACCCCTTT CACCTCTGAA	780
GAGAGGGAAA GATCCAAAG AGAGGCCAAA AAGTACAACC TCACATCAAC CAATAGGCCG	840
GAGGAGGAAG CTAGAGGAAT AGTGATTAGA GACCCAATTG GGACCTAATT GGGACCCAAA	900
TTTCTCAAGT GGAGGGAGAA CTTTGGACGA TTTCCACCGG TATCTCCTCG TGGGTATTCA	960
GGGAGCTGCT CAGAAACCTA TAACTTGTC TAAGGCGACT GAAGTCGTCC AGGGGCATGA	1020
TGAGTCACCA GGAGTGTTTT TAGAGCACCT CCAGGAGGCT TATCAGATTT ACACCCCTTT	1080
TGACCTGGCA GCCCCGAAA ATAGCCATGC TCTTAATTG GCATTTGTGG CTCAGGCAGC	1140
CCCAGATAGT AAAAGGAAAC TCCAAAACT AGAGGGATTT TGCTGGAATG AATACCAGTC	1200
AGCTTTTAGA GATAGCCTAA AAGGTTTTG ACAGTCAAGA GGTGAAAAA CAAAAACAAG	1260
CAGCTCAGGC AGCTGAAAAA AGCCACTGAT AAAGCATCCT GGAGTATCAG AGTTTACTGT	1320
TAGATCAGCC TCATTTGACT TCCCCTCCA CATGGTGTTT AAATCCAGCT ACACTACTTC	1380
CTGACTCAAA CTCCACTATT CCTGTTGATG ACTGTCAGGA ACTGTTGGAA ACTACTGAAA	1440
CTGGCCGACC TGATCTTCAA AATGTGCCCC TAGGAAAGGT GGATGCCACC ATGTTACAG	1500
ACAGTAGCAG CTTCTCGAG AAGGGACTAC GAAAGGCCGG TGCAGCTGTT ACCATGGAGA	1560

CAGATGTGTT GTGGGCTCAG GCTTTACCAG CAAACACCTC AGCACAAAAG GCTGAATTGA 1620

TCGCCCTCAC TCAGGCTCTC CGATGGGGTA AGGATATTAA CGTTAACT GACAGCAGGT 1680

ACGCCTTTGC TACTGTGCAT GTACGTGGAG CCATCTACCA GGAGCGTGGG CTA CTCACCT 1740

CAGCAGGTGG CTGTAATCCA CTGTAAAGGA CATCAAAAGG AAAACACGGC TGTGCCCCGT 1800

GGTAACCAGA AAGCTGATTC AGCAGCTCAA GATGCAGTGT GACTTTCAGT CACGCCCTCA 1860

AACTTGCTGC CCACAGTCTC CTTTCCACAG CCAGATCTGC CTGACAATCC CGCATACTCA 1920

ACAGAAGAAG AAAACTGGCC TCAGAACTCA GAGCCAATAA AAATCAGGAA GGTGGTGGA 1980

TTCTTCCTGA CTCTAGAATC TTCATACCCC GAACTCTTGG GAAACTTTA ATCAGTCACC 2040

TACAGTCTAC CACCCATTTA GGAGGAGCAA AGCTACCTCA GCTCCTCCGG AGCCGTTTTA 2100

AGATCCCCCA TCTTCAAAGC CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC 2160

AGGTAAATGC CAAAAAGGT CCTAAACCCA GCCCAGGCCA CCGTCTCCAA GAAACTCAC 2220

CAGGAGAAAA GTGGGAAATT GACTTTACAG AAGTAAACC ACACGGGCT GGGTACAAAT 2280

ACCTTCTAGT ACTGGTAGAC ACCTTCTCTG GATGGACTGA AGCATTTGCT ACCAAAAACG 2340

AACTGTCAA TATGGTAGTT AAGTTTTTAC TCAATGAAAT CATCCCTCGA CATGGGCTGC 2400

CTGTTTGCCA TAGGGTCTGA TAATGGACCG GCCTTCGCCT TGTCTATAGT TTAGTCAGTC 2460

AGTAAGGCGT TAAACATTCA ATGGAAGCTC CATTGTGCCT ATCGACCCCA GAGCTCTGGG 2520

CAAGTAGAAC GCATGAACTG CACCCTAAAA AACACTCTTA CAAAATTAAT CTTAGAAACC 2580

GGTGTAATTT GTGTAAGTCT CCTTCCTTTA GCCCTACTTA GAGTAAGGTG CACCCCTTAC 2640

TGGGCTGGGT TCTTACCTTT TGAAATCATG TATGGGAGGG TGCTGCCTAT CTTGCCTAAG	2700
CTAAGAGATG CCCAATTGGC AAAAATATCA CAAACTAATT TATTACAGTA CCTACAGTCT	2760
CCCCAACAGG TACAAGATAT CATCCTGCCA CTGTTCGAG GAACCCATCC CAATCCAATT	2820
CCTGAACAGA CAGGGCCCTG CCATTCATTC CCGCCAGGTG ACCTGTTGTT TGTTAAAAAG	2880
TTCCAGAGAG AAGGACTCCC TCCTGCTTGG AAGAGACCTC ACACCGTCAT CACGATGCCA	2940
ACGGCTCTGA AGGTGGATGG CATTCTGCG TGGATTCATC ACTCCCGCAT CAAAAAGGCC	3000
AACAGAGCCC AACTAGAAAC ATGGGTCCCC AGGGCTGGGT CAGGCCCTT AAAACTGCAC	3060
CTAAGTTGGG TGAAGCCATT AGATTAATTC TTTTCTTAA TTTTGTA AAA CAATGCATAG	3120
CTTCTGTCAA ACTTATGTAT CTTAAGACTC AATATAACCC CCTTGTATA ACTGAGGAAT	3180
CAATGATTG ATTCCCCAA AACACAAGT GGGGAATGTA GTGTCCAACC TGGTTTTTAC	3240
TAACCCTGTT TTAGACTCT CCCTTTCCTT TAATCACTCA GCTTGTTCC ACCTGAATTG	3300
ACTCTCCCTT AGCTAAGAGC GCCAGATGGA CTCCATCTG GCTCTTTCAC TGGCAGCCGC	3360
TTCTCAAGG ACTTAAGTGTG TGCAAGCTGA CTCCAGCAC ATCCAAGAAT GCAATTAAT	3420
GATAAGATAC TGTGGCAAGC TATATCCGCA GTTCCCAGGA ATTCGTCCAA TTGATCACAG	3480
CCCCTCTACC CTTAGCAAC CACCACCCTG ATCAGTCAGC AGCCATCAGC ACCGAGGCAA	3540
GGCCCTCCAC CAGCAAAAAG ATTCTGACTC ACTGAAGACT TGGATGATCA TTAGTATTTT	3600
TAGCAGTAAA GTTTTTTTTT CTTTTCTTT CTTTTTTCT CGTGCC	3646

Claims

1. An isolated DNA molecule, comprising:
 - (a) a nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227;
 - (b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained; or
 - (c) a nucleotide sequence encoding an epitope of a polypeptide encoded by at least one sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.
2. An isolated DNA molecule encoding an epitope of a polypeptide, wherein said polypeptide is encoded by a nucleotide sequence that:
 - (a) hybridizes to a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions; and
 - (b) is at least 80% identical to a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227;and wherein RNA corresponding to said nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue.
3. An isolated DNA molecule encoding an epitope of a polypeptide, wherein said polypeptide is encoded by:

(a) a nucleotide sequence transcribed from the sequence of SEQ ID NO: 141; or

(b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained.

4. An isolated DNA or RNA molecule comprising a nucleotide sequence complementary to a DNA molecule according to any one of claims 1-3.

5. A recombinant expression vector comprising a DNA molecule according to any one of claims 1-3.

6. A host cell transformed or transfected with an expression vector according to claim 5.

7. A polypeptide comprising an amino acid sequence encoded by a DNA molecule according to any one of claims 1-3.

8. A polypeptide according to claim 7 wherein said polypeptide comprises an epitope of an amino acid sequence encoded by at least one nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

9. A monoclonal antibody that binds to a polypeptide according to claim 7.

10. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, at least one polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

11. A method for determining the presence of breast cancer in a patient comprising detecting within a biological sample, at least one polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

12. The method of claims 10 or 11 wherein the biological sample is a portion of a breast tumor.

13. The method of claim 10 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody according to claim 9.

14. The method of claim 11 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody that binds to a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

15. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, an RNA molecule encoding at least one polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

16. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, at least one RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID

NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions; and therefrom determining the presence of breast cancer in the patient.

17. The method of claims 15 or 16 wherein the biological sample is a portion of a breast tumor.

18. The method of claim 15 wherein the step of detecting comprises:

(a) preparing cDNA from RNA molecules within the biological sample;
and

(b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

19. The method of claim 16 wherein the step of detecting comprises:

(a) preparing cDNA from RNA molecules within the biological sample;
and

(b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions; and therefrom determining the presence of breast cancer in the patient.

20. A polypeptide according to claim 7 for use within a method for detecting the presence of breast cancer in a patient.

21. A polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions, for use within a method for detecting the presence of breast cancer in a patient.

22. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, in a biological sample, of at least one polypeptide according to claim 7 at a first point in time;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

23. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting in a biological sample an amount of at least one polypeptide at a first point in time, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

24. The method of claims 22 or 23 wherein the biological sample is a portion of a breast tumor.

25. The method of claim 22 wherein the step of detecting comprises contacting a portion of the biological sample with a monoclonal antibody according to claim 9.

26. The method of claim 23 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody that binds to a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86

and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

27. The method of either of claims 20 or 22 wherein said polypeptide comprises an epitope of an amino acid sequence encoded by at least one nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

28. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, within a biological sample, of at least one RNA molecule encoding a polypeptide according to claim 7 at a first point in time;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

29. The method of claim 28 wherein the step of detecting comprises:

- (a) preparing cDNA from RNA molecules within the biological sample;
- and
- (b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide according to claim 7.

30. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, within a biological sample, of at least one RNA molecule at a first point in time, the RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions;

- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

31. A pharmaceutical composition, comprising a polypeptide according to claim 7 and a physiologically acceptable carrier.

32. A pharmaceutical composition for inhibiting the development of breast cancer, comprising a polypeptide and a physiologically acceptable carrier, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

33. A vaccine, comprising a polypeptide according to claim 7 and an immune response enhancer.

34. A vaccine, comprising a DNA molecule according to any one of claims 1-3.

35. A vaccine, comprising a recombinant expression vector comprising a DNA molecule according to any one of claims 1-3.

36. A vaccine for inhibiting the development of breast cancer, comprising a polypeptide and an immune response enhancer, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

37. A diagnostic kit comprising:

- (a) one or more monoclonal antibodies according to claim 9; and

(b) a detection reagent.

38. A diagnostic kit comprising:

(a) one or more monoclonal antibodies that bind to a polypeptide encoded by a nucleotide sequence selected from the group consisting of sequences provided in SEQ ID 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220; and

(b) a detection reagent.

39. The kit of any one of claims 37 or 38 wherein the monoclonal antibody(s) are immobilized on a solid support.

40. A diagnostic kit comprising a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule according to claim 4.

41. A diagnostic kit comprising a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS:78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

42. A diagnostic kit comprising at least one oligonucleotide probe, the oligonucleotide probe containing at least about 15 contiguous nucleotides of a DNA molecule according to claim 4.

43. A diagnostic kit comprising at least one oligonucleotide probe, the oligonucleotide probe comprising at least about 15 contiguous nucleotides of a DNA sequence selected from the group consisting of SEQ ID NOS:78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

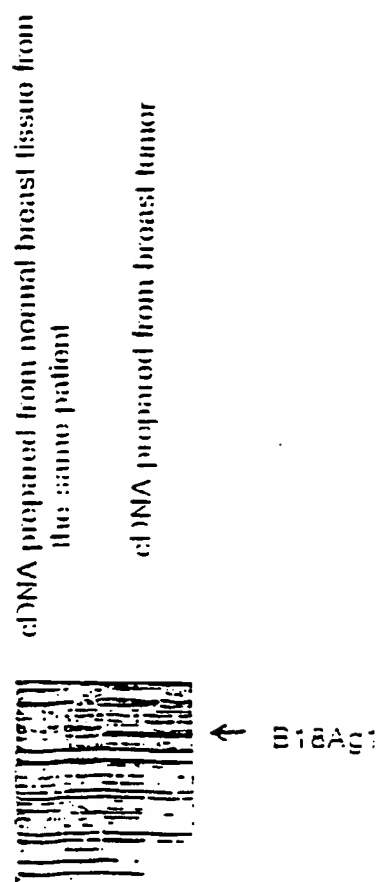


FIG. 1

Breast Tumor mRNA
Normal Breast Tissue mRNA

FIG. 2

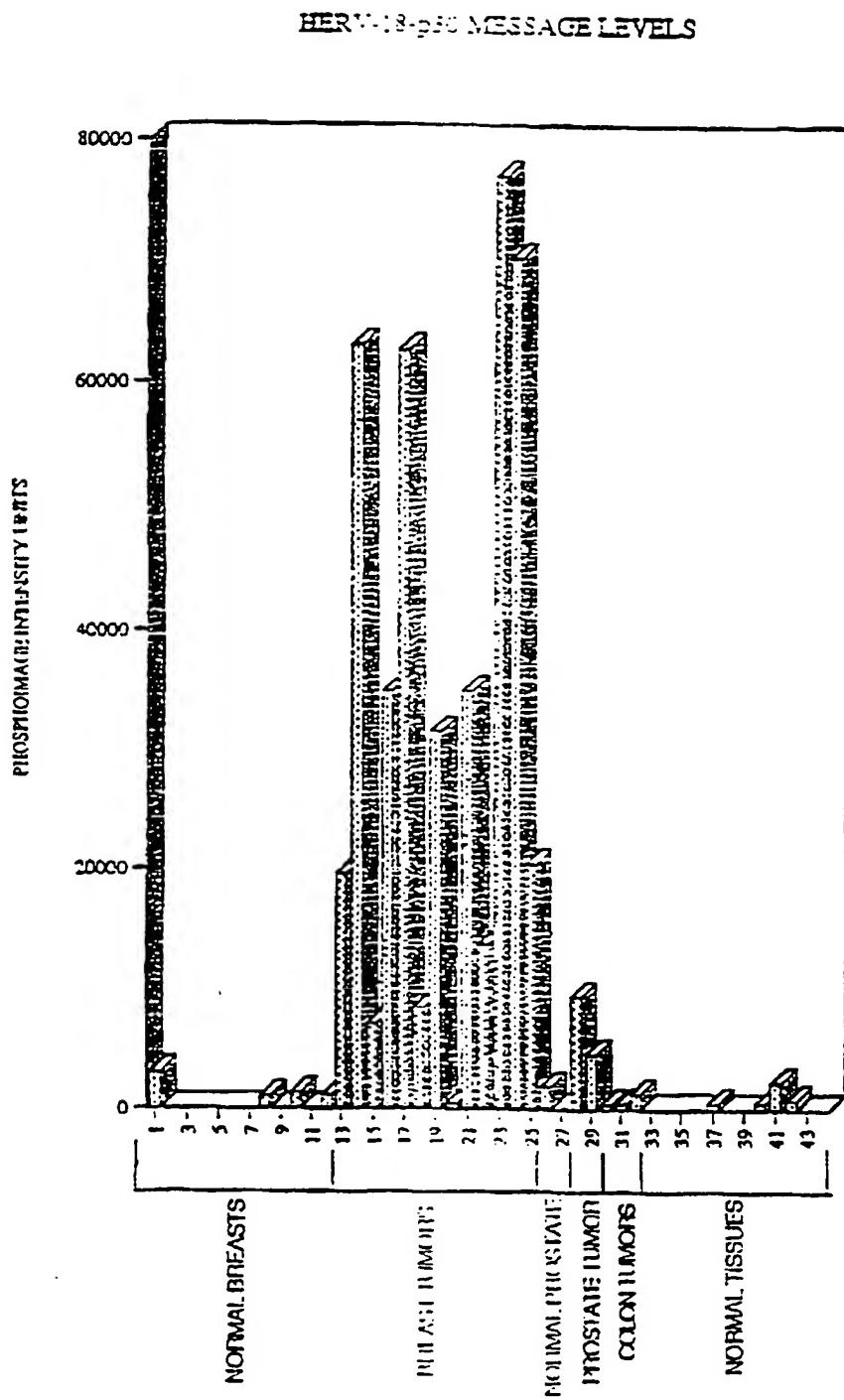


FIG. 3

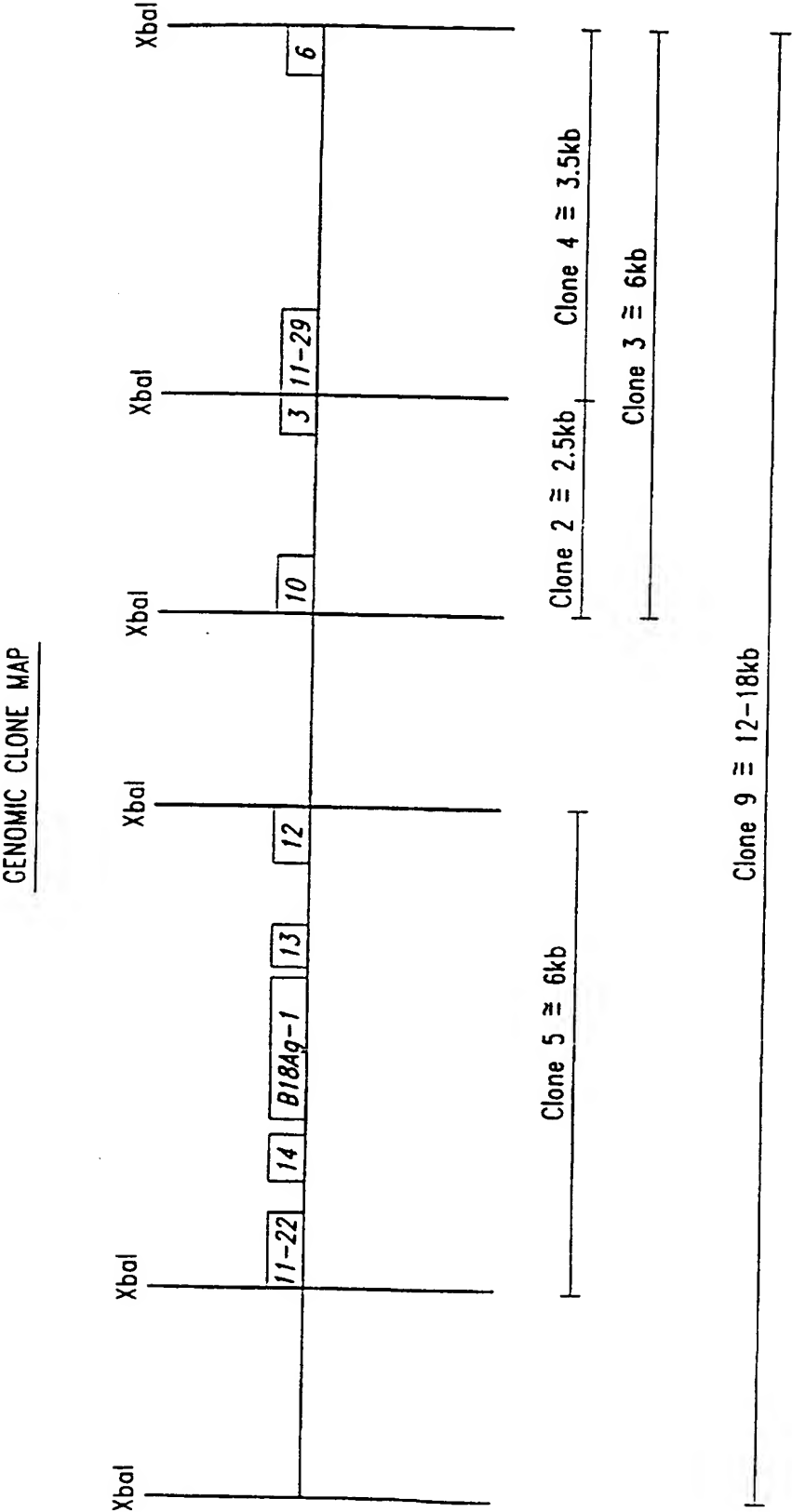
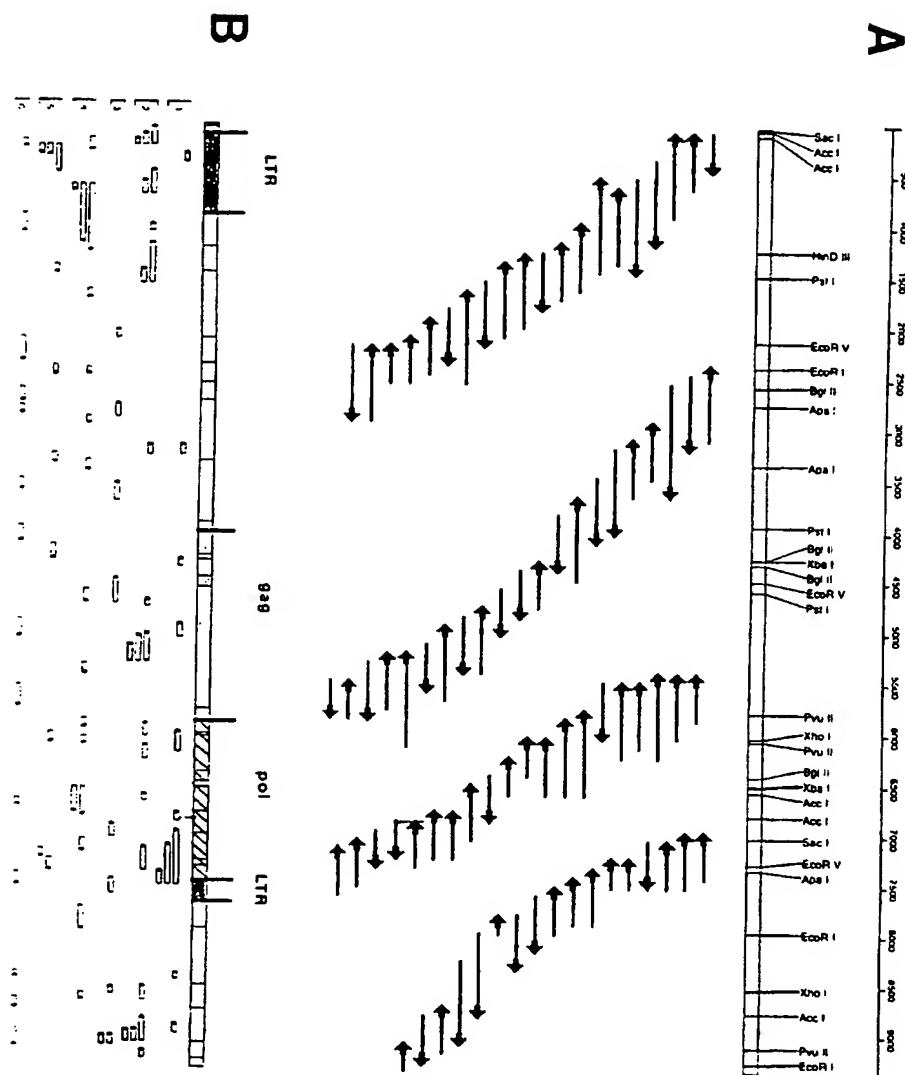


FIG. 4



FIGS. 5A & 5B

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B18Ag1

TTA GAG ACC CAA TTG GGA CCT AAT TGG GAC CCA AAT TTC TCA AGT GGA Leu Glu Thr Gln Leu Gly Pro Asn Trp Asp Pro Asn Phe Ser Ser Gly	48
1 5 10 15	
GGG AGA ACT TTT GAC GAT TTC CAC CGG TAT CTC CTC GTG GGT ATT CAG Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val Gly Ile Gln	96
20 25 30	
GGA GCT GCC CAG AAA CCT ATA AAC TTG TCT AAG GCG ATT GAA GTC GTC Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val	144
35 40 45	
CAG GGG CAT GAT GAG TCA CCA GGA GTG TTT TTA GAG CAC CTC CAG GAG Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu	192
50 55 60	
GCT TAT CGG ATT TAC ACC CCT TTT GAC CTG GCA GCC CCC GAA AAT AGC Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser	240
65 70 75 80	
CAT GCT CTT AAT TTG GCA TTT GTG GCT CAG GCA GCC CCA GAT AGT AAA His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys	288
85 90 95	
AGG AAA CTC CAA AAA CTA GAG GGA TTT TGC TGG AAT GAA TAC CAG TCA Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser	336
100 105 110	
GCT TTT AGA GAT AGC CTA AAA GGT TTT Ala Phe Arg Asp Ser Leu Lys Gly Phe	363
115 120	

FIG. 6

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B17Ag1

GGGCACAGTG GCTCATACCT GTAATCCTGA CCGTTTCAGA GGCTCAGGTG GGGGGATCGC	60
TTGAGCCCAA GATTTCAAGA CTAGTCTGGG TAACATAGTG AGACCCTATC TCTACGAAAA	120
AATAAAAAAA TGAGCCTGGT GTAGTGGCAC ACACCAGCTG AGGAGGGAGA ATCG	174

FIG. 7

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B17Ag2

TGGGGGCTCT GACTAGAAAT TCAAGGAACC TGGGATTCAA GTCCAACGTG GACACCAACT	60
TAACTGTGG NCTCCAATAA ACTGCTTCTT TCCTATTCCC TCTCTATTAA ATAAATAAG	120
GAAAACGATG TCTGTGTATA GCCAAGTCAG NTATCCTAAA AGGAGATACT AAGTGACATT	180
AAATATCAGA ATGTAAAACC TGGGAACCAG GTTCCCAGCC TGGGATTAAA CTGACAGCAA	240
GAAGACTGAA CAGTACTACT GTGAAAAGCC CGAAGNGGCA ATATGTTTAC TCTACCGTTG	300
AAGGATGGCT GGGAGAATGA ATGCTCTGTC CCCCAGTCCC AAGCTCACTT ACTATACCTC	360
CTTTAT	366

FIG. 8

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag2a

TATAATCATG TTTCTCATT TTTTCACATT TTATTACCAA TTTCTGTTA CCCTGAAAAA	60
TATGAGGGAA ATATATGAAA CAGGGAGGCA ATGTTGAGAT AATTGATCAC AAGATATGAT	120
TTCTACATCA GATGCTGTTT CCTTTCCTGT TTATTTCTT TTTATTTGGG TTGTGGGGTT	180
GAATGTAATA GCTTTGTTTC AAGAGAGAGT TTTGGCAGTT TCTGTAGCTT CTGACACTGC	240
TCATGTCTCC AGGCATCTAT TTGCACTTTA GGAGGTGTCG TGGGAGACTG AGAGGTCTAT	300
TTTTTCATA TTG	314

FIG. 9

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag1b

ATACAGTCGG TTTCCATTTA TTTAACCCCC ACCTGAACGG CATAAACTGA GTGTTTCAGCT	60
GGTGTTTTTT ACTGTAAACA ATAAGGAGAC TTTGCTCTTC ATTTAAACCA AAATCATATT	120
TCATATTTTA CGCTCGAGGG TTTTACCGG TTCCTTTTAA CACTCCTTAA AACAGTTTTT	180
AACTCGTTTG GAACAAGATA TTTTTTCTTT CCTGGCAGCT TTAAACATTA TAGCAAATTT	240
GTGTCTGGGG GACTGCTGGT CACTGTTTCT CACAGTTGCA AATCAAGGCA TTTGCAACCA	300
AGAAAAAAAA ATTTTTTTGT TTTATTTGAA ACTGGACCGG ATAAACGGTG TTTGGAGCGG	360
CTGCTGTATA TAGTTTTAAA TGGTTTATTG CACCTCCTTA AGTTGCACTT ATGT	414

FIG. 10

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Agl_a

TATATATTTA ATAACCTAAA TATATTTTGA TCACCCACTG GGGTGATAAG ACAATAGATA	60
TAAAAGTATT TCCAAAAAGC ATAAACCAA AGTATCATAC CAAACCAAAT TCATACTGCT	120
TCCCCCAGCC GCACTGAAAC TTCACCTTCT AACTGTCTAC CTAACCAAAT TCTACCCTTC	180
AAGTCTTTGG TGGGTGCTCA CTACTCTTTT TTTTTTTTTT TTTNTTTTGG AGATGGAGTC	240
TGGCTGTGCA GCCCAGGGGT GGAGTACAAT GGCACAACCT CAGCTCACTG NAACCTCCGC	300
CTCCCAGGTT CATGAGATTC TCCTGNTTCA GCCTTCCCAG TAGCTGGGAC TACAGGTGTG	360
CATCACCATG CCTGGNTAAT CTTTTTTNGT TTTNGGGTAG AGATGGGGGT TTTACATGTT	420
GGCCAGGNTG GTNTCGAACT CCTGACCTCA AGTGATCCAC CCACCTCAGG CTCCCAAAGT	480
GCTAGGATTA CAGACATGAG CC	502

FIG. 11

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B11Ag1

ACATGCAGAA TATTCTATCG GTACTTCAGC TATTACTCAT TTTGATGGCG CAATCCGAGC	60
CTATCCTCAA GATGAGTATT TAGAAAGAAT TGATTTAGCG ATAGACCAAG CTGGTAAGCA	120
CTCTGACTAC ACGAAATTGT TCAGATGTGA TGGATTTATG ACAGTTGATC TTTGGAAGAG	180
ATTATTAAGT GATTATTTTA AAGGGAATCC ATTAATTCCA GAATATCTTG GTTTAGCTCA	240
AGATGATATA GAAATAGAAC AGAAAGAGAC TACAAATGAA GATGTATCAC CAACTGATAT	300
TGAAGAGCCT ATAGTAGAAA ATGAATTAGC TGCATTTATT AGCCTTACAC ATAGCGATTT	360
TCCTGATGAA TCTTATATTC AGCCATCGAC ATAGCATTAC CTGATGGGCA ACCCTTACGA	420
ATAATAGAAA CTGGGTGCGG GGCTATTGAT GAATTCATCC NCAGTAAATT TGGATATNAC	480
AAAATATAAC TCGATTGCAT	500

FIG. 12

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA3c

ACTGATGGAT GTCGCCGGAG GCGAGGGGCC TTATCTGATG CTCGGCTGCC TGTTCGTGAT	60
GTGCGCGGCG ATTGGGCTGT TTATCTCAAA CACCGCCACG GCGGTGCTGA TGGCGCCTAT	120
TGCCTTAGCG GCGGCGAAGT CAATGGGCGT CTCACCCTAT CCTTTTGCCA TGGTGGTGGC	180
GATGGCGGCT TCGGCGGCGT TTATGACCCC GGTCTCCTCG CCGGTTAACA CCCTGGTGCT	240
TGGCCCTGGC AAGTACTCAT TTAGCGATTT TGTCAAATA GGCCTG	286

FIG. 13

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B9CG1

CAGCCCCTTC TTCTCAATTT CATCTGTCAC TACCCTGGTG TAGTATCTCA TAGCCTTACA	60
TTTTTATAGC CTCCTCCCTG GTCTGTCTTT TGATTTTCCT GCCTGTAATC CATATCACAC	120
ATAACTGCAA GTAAACATTT CTAAAGTGTG GTTATGCTCA TGCTACTCCT GTGCCAAGAA	180
ATAGTTTCCA TTACCGTCTT AATAAAATTC GGATTTGTTT TTTCTATTN TCACTCTTCA	240
C	241

FIG. 14

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B9CG3

CAAAGCCAGT GGTTTGAGCT CTCTACTGTG TAAACTCCTA AACCAAGGCC ATTTATGATA	60
AATGGTGGCA GGATTTTTAT TATAACATG TACCCATGCA AATTCCTAT AACTCTGAGA	120
TATATTCTTC TACATTTAAA CAATAAAAAT AATCTATTTT TAAAAGCCTA ATTTGCGTAG	180
TTAGGTAAGA GTGTTTAATG AGAGGGTATA AGGTATAAAT CACCAGTCAA CGTTTCTCTG	240
C	241

FIG. 15

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B2CA2

CGACGTCGGT AAAATCGGAC ATGAAGCCAC CGCTGGTCTT TTCGTCCGAG CGATAGGCGC	60
CGGCCAGCCA GCGGAACGGT TGCCCGGATG GCGAAGCGAG CCGGAGTTCT TCGGACTGAG	120
TATGAATCTT GTTGTGAAAA TACTCGCCGC CTCGTTCGA CGACGTCGCG TCGAAATCTT	180
CGAACTCCTT ACGATCGAAG TCTTCGTGGG CGACGATCGC GGTCA GTTCC GCCCCACCGA	240
AATCATGGTT GAGCCGGATG CTGCCCCCGA AGCCCT	276

FIG. 16

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA1

CCCAGGTCAA CCAGGCTGCA ACACGCAGGT CCTTGGATTG GGCACGAAGC AGCGCTTCGC	60
TGTTTTCCAG GATTTTCAAC CAGTCGGTCT GGCCGTTCTC ATGGAGCGAG AGCGCCTTGC	120
CCAGCTCATT TTCCAGCGCC TCGTATTCGC TGGAAAAACG CACATCCTCA CCCGCAAAGA	180
CATCCTTTGA AATCGGCTGT TCCGCGAGTT CCAGATANTG CGAGGAGAGC TTGCTCGAAT	240
AGGTCATCCT AACCCCTTCAA TGCACACCAT GTGCGCCAAT GAATATCTTA ACAATTCAAC	300
TAGTTGGCAT AANAACCGAA CGAAAATCCC AATAGTCTGA AGAGCTCTTT TG	352

FIG. 17

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA2

CTGCATGTCC ACGGCCTGGA TTTACGGGTG GTCGGCGTTC ACCCCTGGCA GCTGGCGCTC	60
TTCCCGACCA GGCCAGCAG GATGTGTGGG GCAAGGATAA CGGCGTGCGC ATCGCCTCGA	120
CCTATATGCC TACTGGCAAG GCCGAGCCCG TGAAGGCGG ATTCAGGTTC ANCGGTCGCT	180
GGAGCTTTTC CACCGGCTCC ATGCATTGTG ACTGGCTGTT TCTAGGCGGT CTGTTGCCCA	240
AGCGTGATGG TACGTCTGGC CTGGAGCATG TGACTTTCTG	280

FIG. 18

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA3

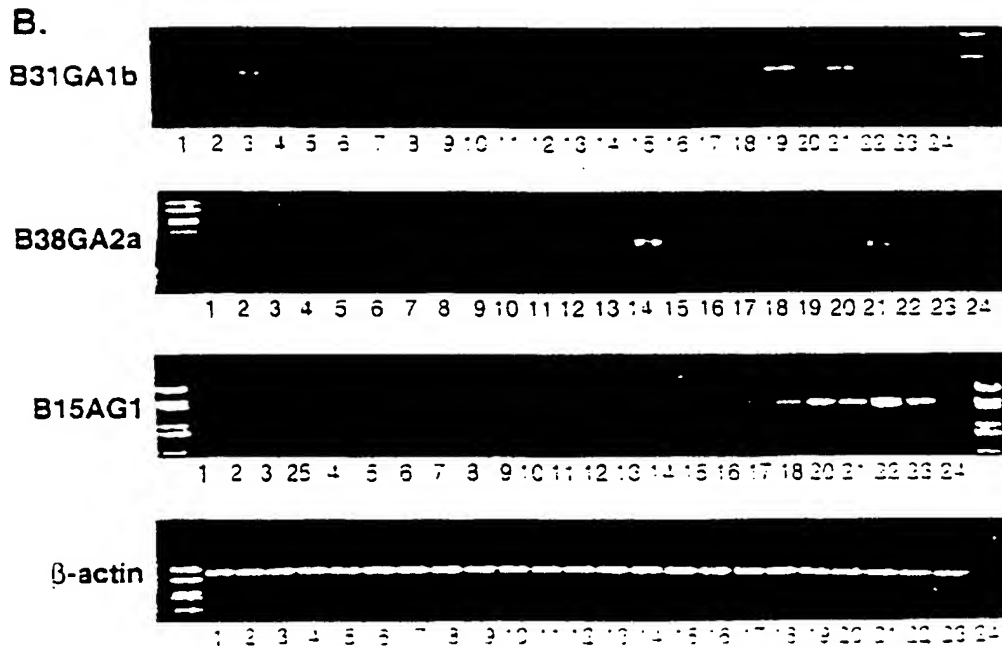
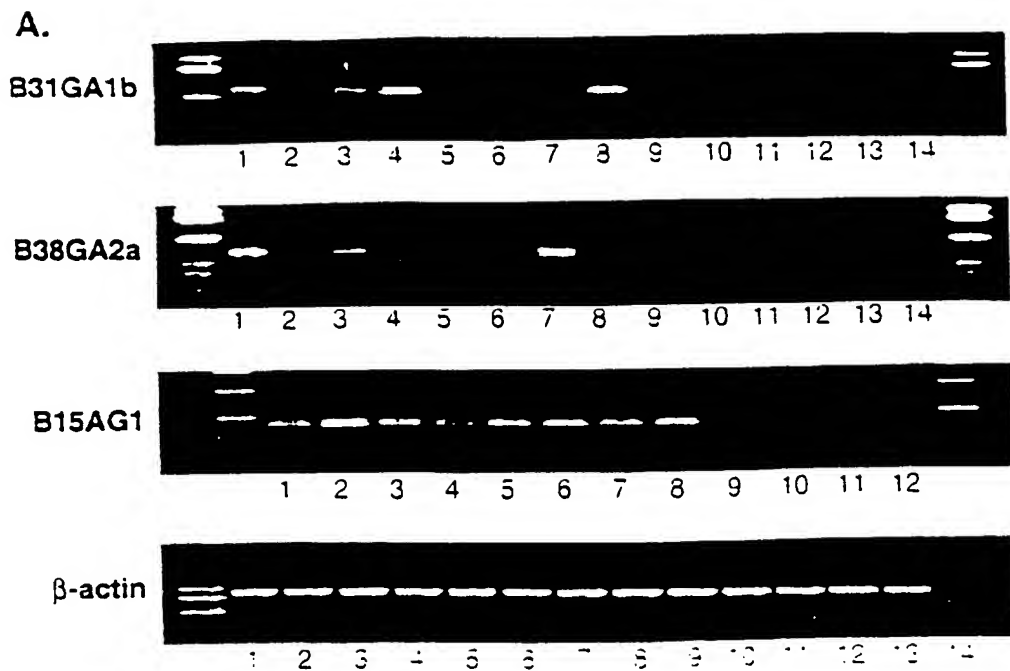
AGCAAGGAGA AGGCCAAGGA GAGGCTCAAG CTGGTCCTGG CCTACGACTG GGCCAAGCTG	60
TCGCCGGGGA TGGTGGAGAA CCTGAAGCGG GACCTCCTCG AGGTCCTCCG CCGCTACTTC	120
TCCGTCCAGG AGGAGGGTCT TTCCGTGGTC TTGGAGGAGC GGGGGGAGAA GATNCTCCTC	180
ATGGTCNACA TCCCCCTCAN GTGATGGTCC TGANGNGNCC CNTCCTCCTT GNCTACGATT	240
TCGGNCTGGT GGCCCTNTTT CT	262

FIG. 19

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B4CA1

AGGAGCGGGT AGAGTGGCAC CATTGAGGGG ATATTCAAAA ATATTATTTT GTCCTAAATG	60
ATAGTTGCTG AGTTTTTCTT TGACCCATGA GTTATATTGG AGTTTATTTT TTAACTTTCC	120
AATCGCATGG ACATGTTAGA CTTATTTTCT GTTAATGATT NCTATTTTTA TTAAATTGGA	180
TTTGAGAAAT TGGTTNTTAT TATATCAATT TTTGGTATTT GTTGAGTTTG ACATTATAGC	240
TTAGTATGT	249

FIG. 20

*FIGS. 21A - B*